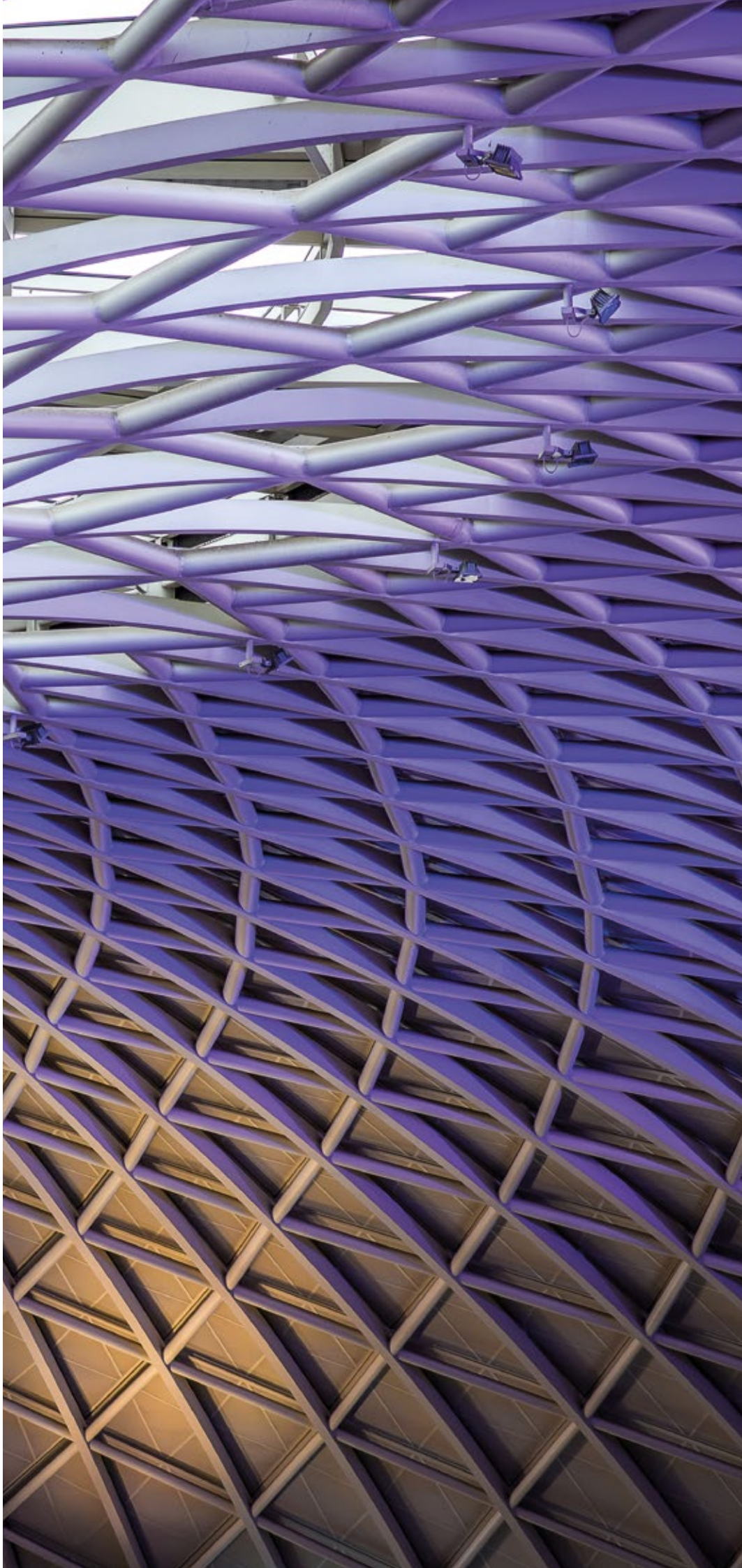
# Architectural Technology Journal



FROM THE CHARTERED INSTITUTE OF ARCHITECTURAL TECHNOLOGISTS
£6.00 – ISSN 1361-326X – ISSUE #140 – WINTER 2021


# AT Awards 2022 open in February

The AT Awards open for submissions on 1 February 2022 for the following Awards:

- Excellence in Architectural Technology
- Student Awards for Excellence in Architectural Technology
- Emerging Talent in the Technology of Architecture
- The Chartered Architectural Technologist of the Year
- Gold Award

Full details and application forms can be found on the website. Winners will be announced and presented at the AT Awards event on 21 October 2022.

The AT Awards are recognised as the premier accolades that demonstrate outstanding achievement in Architectural Technology and celebrate the technology of architecture.

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*AT Journal* is free to all members of CIAT. Subscription rate for non-members is £30 (UK) and £35 (overseas) per annum (4 issues) or £6 per issue.


ISSN 1361-326X.



Another year has quickly flown by in the *Architectural Technology Journal* calendar and I find myself now completing the winter issue once again and preparing for 2022.

The AGM takes place in just over a week as I write this and the Chain of Office will be handed over to your new President, Kevin Crawford MCIAT. We will be meeting him in the next issue and finding out all about him and his plans as President.

I have asked in previous issues for readers to get in touch as I would love to hear from you regarding anything in each edition or if you have any ideas for future articles and I am pleased to include in this issue some thoughts from Steve Judd, Chartered Architectural Technologist.

If you would like to respond to Steve then please email me at editor@ciat.global

I hope you are able to enjoy the festive season and send my very best seasons greetings to you all.

Adam Endacott
**Editor**

**Email from Steve Judd MCIAT, August 2021**

I retired from paid employment just before the COVID-19 pandemic started, meaning that I worked in the immediate aftermath of the Grenfell Tower tragedy. Like many in our industry, I was shocked that in our modern world it was still possible for us to kill innocent people by acts of negligence, perpetrated by individuals employed in our industry. Having written to Dame Judith and seen a couple of the phrases from my letter used in her Interim Report, I've maintained a close eye on the ongoing enquiry and the industry's response to the tragedy.

My prompt in writing to you is not only my understanding of what went wrong at Grenfell, but a couple of the articles in the summer issue (ATJ 138).

The article starting on Page 10, 'The effect of subframe systems on the overall thermal performance of external rainscreen walls' … paragraph on page 11… from 'the Future Home Standard', there is still little focus on achieving the quality assurance that would ultimately avoid the performance gap. At the same time, construction products and techniques must continue to improve to bring operational energy efficient in line with designed energy efficiency.

The legislation in force at the outbreak of the Grenfell fire, was more than adequate to ensure the protection of the property and more importantly, the lives of the inhabitants. The issue at Grenfell is all about implementation of the legislation and industry standards, on site, at the point of construction. As far as I'm aware the original tender drawings for the refurbishment of Grenfell Tower, did specify cladding which had it been installed correctly, to Part ADB, would have prevented the tragedy.

A second article on page 14, 'Ensuring safety through sufficient specification', again touches on this issue. The article's sub-heading says…'The new bill will help achieve a clearer and more consistent system that ensures individual's safety remains the priority, not only throughout the initial construction process, but the entire lifecycle of the building'.

The article goes on to identify the fact that last year, across 98 councils, we managed to fit 33,000 fire doors that were unlikely to satisfy the 30-minute standard! How is that possible? If we can't fit fire doors to the correct specification in 2020, how are we ever going to re-clad/ refurbish buildings safely?

In 1989, I was responsible for what was then, the largest refurbishment project ever undertaken by Rolls-Royce Derby's architects department. We refurbished a three storey office block, within which, where over 75 door sets.

After I'd produced the drawing of the doors and the associated ironmongery schedule, I can clearly remember sitting down with the Building Inspector and going through each door set, its position, why it was there, its fire rating, glazing, smoke sealing and ironmongery, and then getting the drawing signed off before we ever got to site. Didn't half make the Clerk of Works (CoW) job and the snagging easy!

The point I'm struggling to get across, please forgive me, from these two examples in our Journal is, there is a clear, auditable, procedure which every construction project should follow;

1. The drawings and specifications, provided by the designer, should be checked and correct.
2. The Quantity Surveyor (QS), should price what's on the drawing.
3. The Principal Contractor (PC) should purchase the correct materials, based on the QS's take off, the specification and the drawings.
4. The manufacturer should supply the correct materials to the work site.
5. The PC should check the materials delivered are as manufactured, ordered and specified.
6. The PC should ensure that the materials are installed in-line with the drawings, manufacturers' guidance and the Building Regulations.
7. The installation should be signed off by the Clerk of Works, who is employed by the Designer.

Assuming colleagues broadly agree with the above, I'd like to open a debate on this last point. To close the procedure circle above, we need to link the designer's intentions with what actually got built. Our Industry was run like this for hundreds of years. The designer employed the CoW, to ensure that what was built was what was intended. Indeed, many of our cathedrals and ancient buildings have recognised the importance of the CoW position.

So instead of us reinvigorating a role which already exists, I think the Draft Building Safety Bill which is currently before Parliament, will just add more bureaucracy to the process and not address the real issue; getting built correctly, what was drawn and specified.

What do others think? I recognise that there may well be other ways of achieving our goal, learnt through hard experience and which I may not have considered. It would be good to get their thoughts. ■

# The cavity wall real performance question?

Words by John Shillabeer, Chair, Cavity Trays Ltd

Can the actual heat-loss from a newly constructed property be greater than you calculated or realised? This question was asked in the early part of this year by the owner of a recently built property that became surprisingly cold during, and following, heavy storms. He had never considered to what extent wet masonry can increase heat-loss from the building.

Heat-loss calculations take all of this into account – or do they? Calculations of the thermal behaviour of cavity walls are not based on using water saturated bricks. Calculations are based on dry bricks or minimally wet bricks, with a water content of 5% maximum. This is fine when one considers performance during summer months, but not so in winter, when one relies most on conserving heat? As an outside skin becomes wetter, its conductivity increases and its thermal integrity worsens.

However, the situation deteriorates further because of evaporative cooling (EC). EC affects humans and buildings. When we swim in the sea and then emerge from the water, the body feels cold and becomes colder, because of EC. The air is causing the water on your skin to evaporate, and that draws heat from your body.

Buildings have skins too, and a buildings' wet outside skin will also suffer EC, accelerating heat-loss from the structure. Unlike your body, where the water lays on your skin surface, the brick outer skin of a building can be saturated with water, so EC can really accelerate the thermal loss.

It is also worth remembering how some masonry is tested to BS 4315. The test involves spraying water onto a given area at a rate of 2.5 litres per minute. The test takes place over 48 hours. Upon completion of the test, it is not unusual to read the 'bricks indicated very low levels of rates of rain penetration.' It is often not realised the spraying is not continuous. It lasts just one minute, followed by a half-hour pause, after which there is another one minute of spraying and so on. Over 48 hours the extent of water spraying amounts to less than 1½ hours. If it only ever rains in your district for exactly one minute followed always by half an hours' drying time, then perhaps the Standard is meaningful, albeit not realistic of the climate experienced in the UK? Especially when one remembers wet winter days with accompanying high winds...and EC. As a realist might point out, the conductivity of a clay brick can double when it is saturated.


**Two considerations**

Two simple considerations can help minimise overall thermal loss through a cavity wall. The first requires appropriate cavity tray specification to manage water arrestment and water evacuation. The more swiftly and efficiently the external skin returns to dry status – the better, and with it, acceleration of thermal loss diminishes.

Awarded European Technical Approval for its water-arrestment protective products, UK company, Cavity Trays Ltd of Yeovil is the only UK cavity tray manufacturer awarded ETA and offers construction overviews and a take-off service. The company also manufactures a wide range of wall weeps and vents, so elevations can benefit tray-compatible balanced cavity ventilation and water removal.

The second consideration refers to a cavity wall reveal closer that does what no other reveal closer offers. Called a Continuity Closer, it features an L-shaped insulating core. Being L-shaped instead of the conventional rectangular shape permits it to wrap across the surface of partial-fill cavity insulation, and in so doing it over-sails/covers those gaps that are often witnessed on sites where ordinary closers and cavity insulation are meant to abut – but don't. The Continuity Closer physically layers those gaps that would otherwise be left and adversely increase heat-loss.

Building envelope performance is reliant on many build details coming together, and the two simple examples demonstrate how improvement is readily available and readily achievable. ■

# Designing for sustainability: Tools to help you design greener

Words by Graphisoft

In November, the eyes of the world turned to Glasgow as it hosted the UN Climate Change Conference of the Parties (COP26) and once again brought the issue of climate change into sharp focus.

The need to halt global warming has reached a crescendo and it is clear that the actions we all take as individuals, communities, companies and countries will make a difference to generations to come.

**Sustainability challenges for the construction sector**

According to the UK Green Building Council, the built environment is responsible for around 40% of the UK's carbon emissions. About 50% of the sector's emissions are from buildings in use; from heating, lighting and cooling.

Architectural Technology professionals, architects and engineers have a unique responsibility to dramatically reduce both the embodied carbon emissions that are created at all stages of a building's construction or refurbishment, and the operational carbon emissions that are created through heating and cooling.

The RIBA 2030 Climate Challenge was developed to help meet net zero whole life carbon for both new and retrofitted buildings by 2030.

**The value of passive design**

Passive design approaches, coupled with sustainably and locally sourced materials, can help to reduce the CO2 emissions caused by our buildings. By testing and combining different approaches and options, Architectural Technology professionals can find the optimum solutions for each building to maximise its sustainability.

Solutions such as shading, pre-cooling of supply air, night purging, natural ventilation, air-tightness, mechanical ventilation with heat recovery (MVHR), insulation, avoiding thermal bridges, passive solar gain and exploiting internal heat sources can all be employed, some of which are discussed below.

**Sun studies and building orientation**

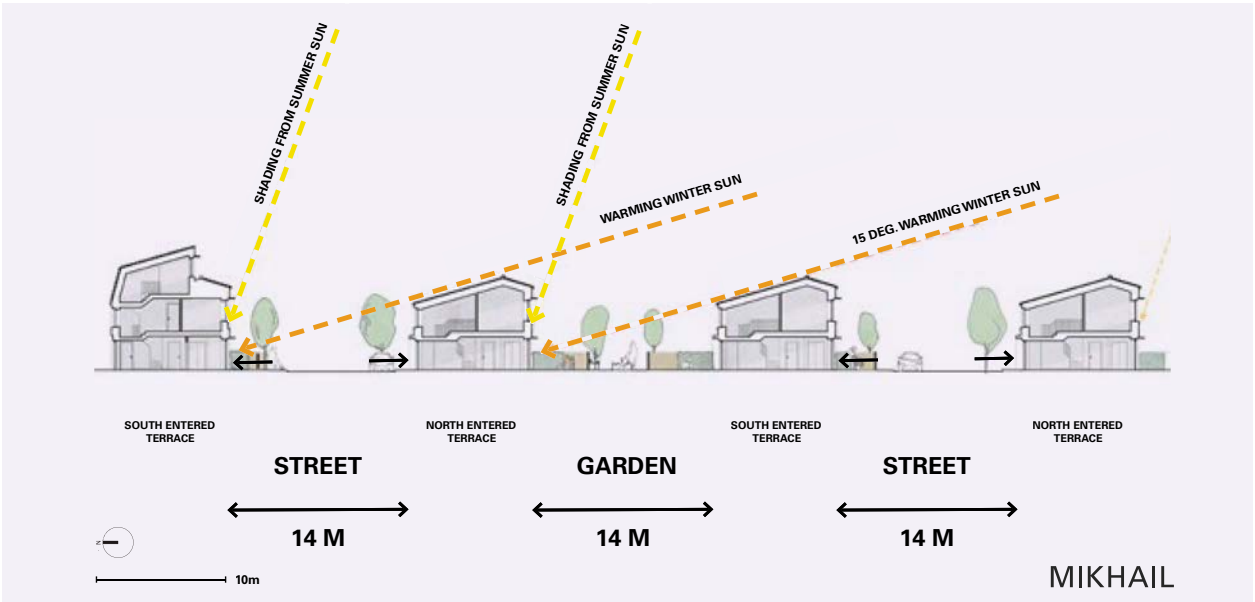
Wherever possible, a building should be positioned to make the best use of the sun as it moves throughout the day. By orienting a building in this way, you will require less equipment to achieve thermal indoor comfort through either mechanical or electrical heating or cooling.

**Natural ventilation**

Natural ventilation is the movement of air throughout the building without any need for mechanical strategies such as fans and extractors. This can be achieved with openable windows and doors to benefit from the prevailing winds as well as sky courts and atriums to help prevent over-heating. For successful natural ventilation, the higher the ceiling levels, the better, as the air becomes cooler at the occupants' head level.

**Shading systems**

Shading systems such as louvers, balconies and overhangs can be incorporated into the building façade design in several ways, using a range of different materials. To help work out the optimal size and angle of the shading device, there are a number of websites which have solar angle calculators such as the solar electricity handbook.




At Mikhail Riches' Stirling Prize-winning Goldsmith Street, all the terraces face south. This allows them to maximise solar gain while shading provides protection from the high summer sun.

Designed by BRP, the central atrium at APRA House has high electric windows to draw out warm air during the summer months. Meanwhile, the roof extends over the southerly glazing to offer shading from summer sun, whilst allowing the lower winter sun to enter deeply into the space benefitting from the solar gain.

**Water collection**

When designing sustainable buildings, rainwater collection is a fundamental design decision which is often overlooked. Rainwater should be collected, purified and used for grey water in the building. Systems can be a combination of passive design solutions (pitched roofs, etc.) and mechanical solutions for harvesting the water and pumping it back into the building.

Fife Architects designed Iron Mill Bay House to perform as efficiently as possible in terms of energy and impact on the environment. The team created a highly insulated house using renewable energy sources including an air source heat pump and a rainwater harvesting system. © Keith Hunter

**Fabric first**

Choice of materials is one of the most critical elements of sustainable design. Availability and performance are the main factors to consider and recyclable, energy efficient materials with low costs should be the first choice.

When considering material choices for sustainable buildings, it is important to consider both the thermal mass—the ability to store heat energy—and the carbon footprint of the material. For more information, the BRE website includes a comprehensive guide to sustainable products and materials.

**Tools to help you design greener**

When designing new buildings, or retrofitting existing structures, there are a number of tools that can support Architectural Technology professionals, architects and engineers in design, calculations and decision making.

Tools such as Graphisoft's Energy Evaluation, included with ArchiCAD, can be used in the early stages of design to carry out multiple simulations before the full building has been modelled. It can also be used later to check the thickness of insulation, carry out thermal analysis, check the best use of materials etc.

Energy Evaluation is designed to help undertake energy use calculations to prepare the model to be fully certified externally. The energy performance of the building once it is in use must also be considered and ArchiCAD contains a full catalogue of building materials that have been assigned their properties so you can easily calculate energy usage.

Other software examples include ANSYS Fluent, Bentley Hevacomp, AECOsim, EnergyPlus (EERE), Ecotect, Graphisoft's EcoDesigner STAR, SAP, Vectorworks Energos, Insight, Project Solon and so on.

These range from stand-alone applications through to complex spreadsheets resulting in different user experiences, outputs and outcomes.

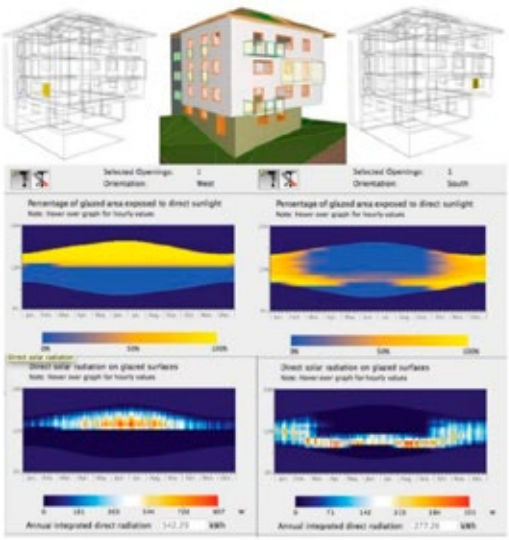
If you are looking for software to help in this area, key questions to ask are:

- How easy is the software to use?
- How well does it integrate, or collaborate with other software?
- Can it render high quality images?
- Can it render in real time?
- Can it do native thermal simulations?
- Does it do daylight analysis?

For those who need software that can complete a full analysis, Graphisoft's EcoDesigner STAR extension is available for all ArchiCAD customers. Users can take multiple reports from the same model and compare changes and revisions to help inform and explain design decisions.

EcoDesigner STAR also offers:

1. BIM Geometry and Thermal Property Data Export
2. Thermal Bridge Simulation
3. Expert Building Systems Settings
4. On-Site Renewables
5. Building Energy Simulation Using Standard-Compliant Analysis Engine
6. Energy Performance of Thermal Blocks
7. Building Energy Performance Rating



However, if you choose to use a different software for certifications, then it is also straightforward to export directly from ArchiCAD to third party software.

**Design for the future**

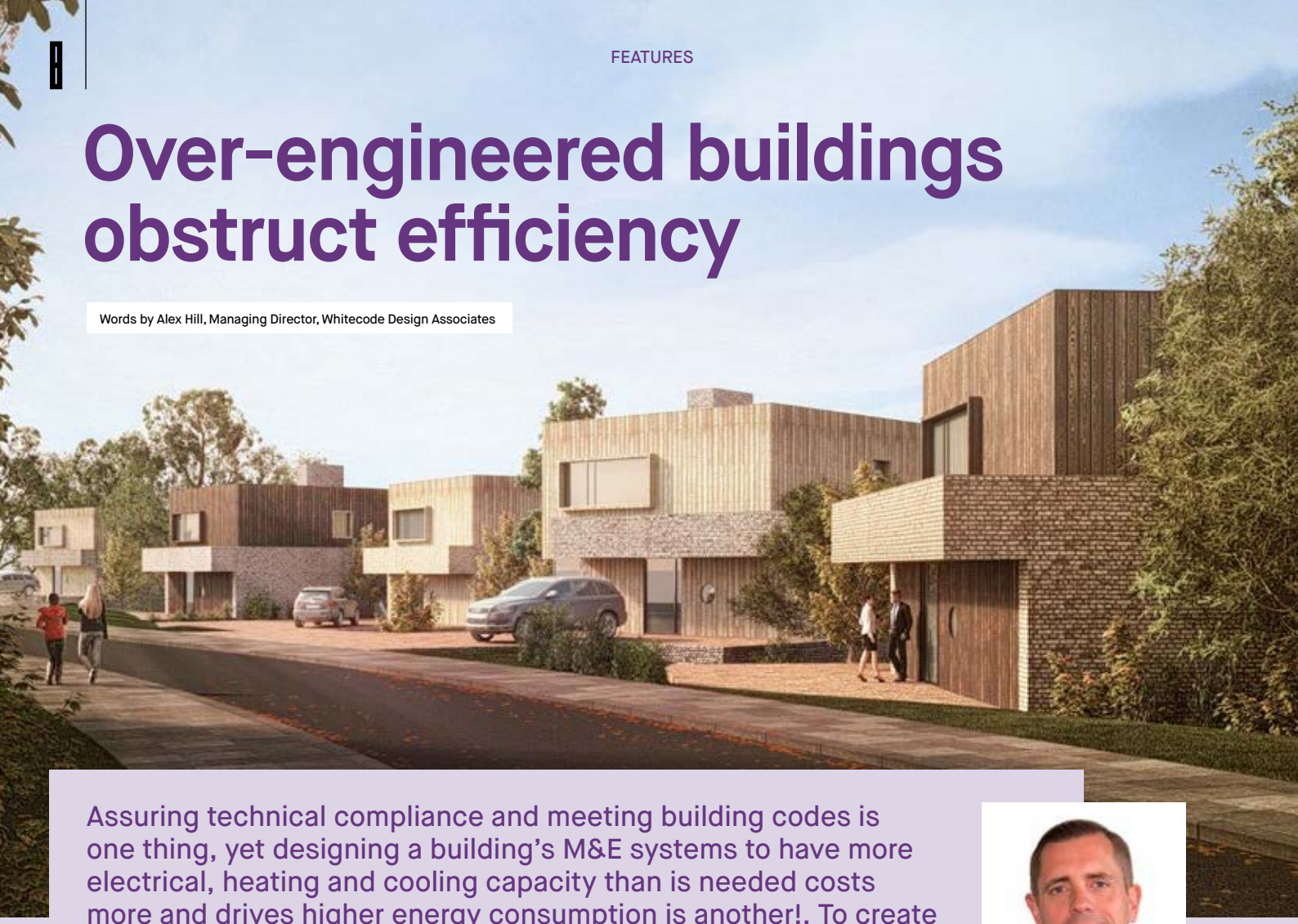
There is no doubt that the ambition to create more sustainable buildings and to reduce energy usage throughout the built environment is challenging.

In addition, there is no 'one size fits all' approach and you will therefore need to consider different options to meet sustainability requirements and targets.

However, by adopting the strategies outlined above, and by using the array of software and tools available to help, you can work towards designing buildings that are both environmentally friendly and comfortable. As a result, you will successfully reduce both energy consumption and energy costs of the building, increase air quality and improve user satisfaction and productivity. ■

# Over-engineered buildings obstruct efficiency

Words by Alex Hill, Managing Director, Whitecode Design Associates



Assuring technical compliance and meeting building codes is one thing, yet designing a building's M&E systems to have more electrical, heating and cooling capacity than is needed costs more and drives higher energy consumption is another!. To create spaces which hit the mark on efficiency, quality and comfort, what smarter considerations can be utilised to ensure building services perform as designed and maintain a thermally comfortable environment for occupants?

Over-engineering has a significant impact on the cost and performance of a building project or scheme, particularly in terms of efficiency. Signs of over-engineering can manifest themselves in a variety of ways; from plant cycling to uncomfortably warm spaces, to slow pump speeds and stop-start chillers. These inefficiencies have a draining effect on a building's performance and occupant comfort, and can also negatively impact a building's green credentials.

**Over-engineering: what is the deal?**

Over-engineering can occur for many reasons, but the majority of the time it can be as a result of human behaviour. We are, arguably, predisposed to err on the side of caution when there is a certain degree of risk. Where there are ambiguities human beings will over-compensate, just to be sure they have shielded themselves against anything that has the potential to cause any damage. The same can be said for construction projects; under-designing is known to affect companies' insurance claims, so for engineers it is no wonder they make certain concessions, giving a 20% leeway just to be sure.

This leeway however, isn't something done arbitrarily but grounded in the building regulations. Publications such as the 18th edition of the New Wiring Regulations, known as BS 7671, published by the Institution of Engineering and Technology (IET), recommends an additional 20% capacity for future uses. Whilst this capacity has been enshrined in building regulations, its implication on over-engineering is problematic. The extra capacity currently implies that electrical networks are being designed 20% larger than they need to be and based on potential forecasts. By project completion, if we apply this principle to all building services, these incremental increases create a massively over-engineered building that could be avoided if exact figures were ascertained. At the moment this current practice is resulting in high degrees of inefficiency.

To challenge this systemic issue, change must come from within. Some degree of commonality needs to be identified so designers can make their calculations with as much reliability and accuracy as possible.

**Overcoming over-engineering**

One of the options which has the potential to combat over-engineering is data. The built environment sector's digital maturity is developing day-by-day, with more and more companies finding they now have the appetite to utilise different technologies.

There is certainly the culture available to make data sharing a viable solution to over-engineering. For the very first time we are seeing the GLA (Greater

London Authority) request the data capture of meters to accurately benchmark the schemes that are being implemented in a specific area. Should this be successful, the sector will be able to learn from this and see the real-time electrical performance of a building.

To highlight data's benefits, let us take an example. On a residential high-rise development comprising 400 flats, from the initial calculations it is clear the development requires 1000kw of electrics. But what if designers had access to meter data from previous developments? Would this visibility enable them to make more accurate predictions? If there was, for instance, the data to monitor the actual use over the course of three years, it might show us that only 600kw is being demanded. Consider the extent in which this would help designers to anticipate expected loads with greater confidence and reliability. Even the smallest change in pipework length or cable size has a knock-on effect on a building's entire system; from the insulation, to the clips, weight and strength or screws, pump size, and standing heat loss. The list goes on. If we make use of data sharing, engineers could design products more efficiently.

The data could then be used as an education tool – to learn from previous projects in order to improve future ones. With data access, designers will be able to ask themselves what could they have done better; if the electric or heating load is accurate, and whether anything else could have been executed to make a product more efficient. The visibility and traceability which data provides would greatly reduce the likelihood of over-engineering, as engineers are able to gauge the predicted energy usage from data that is shared by the electrical supplier.

**How to make it a reality?**

Whilst EPCs are a prerequisite for all buildings, we need to make sure there is the interest and incentive to roll-out this approach to all areas of the industry. In order for this to be delivered across construction efficiently and professionally, legislation would have to be put in place as opposed to advisories. The data would also have to be held in a central repository that is secure; either stored on an online library or made accessible through a reputable industry body. Once it is available the data would have to be listed in the design standards such as CIBSE, IET and the electrical design manuals so the design standards reflect the benchmarks.

Whilst there are many ways to overcome over-engineering, the utilisation of data will undoubtedly enable designers to have more clarity when it comes to ascertaining how a building performs. If the data is able to capture the actual loads once a building is in use, consider the vast difference it will make to the way engineers consider a scheme's electrical network. It will offer more reliability for the designers and better value for their clients, and will greatly improve the overall efficiency of a building once it is in use. ■

**Whilst there are many ways to overcome over-engineering, the utilisation of data will undoubtedly enable designers to have more clarity when it comes to ascertaining how a building performs.**

# Rooflights and zinc roofing

Words by Paul Trace, Director, Stella Rooflight

Despite being used for over 200 years, zinc roofs have hit their prime. Versatile, robust and with multiple colours and styling options, they are a designer's dream. With a growing focus on sustainability in design, zinc is a 100% recyclable material that is also energy efficient to produce. With so many benefits, zinc roofing is an attractive proposition for properties.

However, often designers will talk about the trade-off you may have to make with a zinc roof. For example, many designers may steer away from zinc if you are planning to add rooflights. Similarly, designers might focus on other natural light options if a zinc roof is the right choice for your property. However, does there always have to be a trade-off? Here we uncover the myths around rooflights and zinc roofs and offer some top tips to ensure you can achieve the best of both worlds.

**Why is zinc roofing so popular?**

With their contemporary styling, it is hard to believe that zinc has been used in roofing for centuries. However, it is the contemporary appearance that is really allowing zinc to grow in popularity. Whereas some roofing material will mean compromising your building materials, zinc offers a huge variety of colours and finishes so that it can work in harmony with almost any structure.

This versatility makes zinc ideal for a range of roofing projects. For example, agricultural projects, converted barns as well as listed or protected buildings, such as those in conservation areas. Zinc colours can blend or contrast with the building, while different textures such as ripples, grooves and scales can help enhance the aesthetic.

**Ready for weather and the next 100 years**

As well as the design and aesthetics, a zinc roof offers longevity. It has excellent weatherproof properties and is UV-resistant. This ability to withstand harsh conditions adds to the lifespan of a zinc roof, as does the ability to resist corrosion. In fact, some describe zinc as self-healing as it has an unusual ability to repair itself over time when it comes to surface scratches.

All of this combined means that zinc roofing can have a long-term serviceable life. In some cases, zinc roofing can last for up to 100 years. During such a long lifespan, the maintenance requirement is minimal. The most important maintenance is to clear debris such as fallen leaves and ensure the zinc is treated where necessary.

**Can you install rooflights in a zinc roof?**
There are several concerns when it comes to installing rooflights on a zinc roof. One is the fact that rooflights can tend to look bulky on a zinc roof. This is especially apparent as a zinc roof can have an ultra-thin profile. The fact that many rooflights can have a bulkier frame can deter designers and property owners.

When there is an overlap or large seam, there is also a potential problem with heavy rainfall. A thicker rooflight profile can increase the risk of water ingress. This can also be exacerbated when the roof pitch is low. Without a high angle to promote water run-off, there is a risk that water will pool at the top of the rooflight. This may be fine in the short term but may cause long term issues, especially if the water finds a way into the roof.

The way to get around this, is to opt for rooflights that can fit flush against the roof. Having an ultra-thin frame that sits flush against the roof can help prevent the risk of water ingress while also offering a more pleasing aesthetic and maintaining the clean lines of the roof.

**Zinc roof rooflights: Key considerations**
If you are looking to incorporate rooflights into a zinc roof, there are factors to consider to ensure it is a success:

**1. Design**
A zinc roof is often chosen because of its aesthetic. The installation of a rooflight, particularly bulky rooflights, can be unsightly on the streamlined, thin profile of a zinc roof.

Often, zinc roofing is used in conservation areas as it can work sympathetically with slate roofing. However, for rooflights to be approved by conservation building officers, it is crucial for the rooflights to be part of the seamless design of the roof. A subtle design is essential, and this is best achieved by using rooflights that sit flush against the roof so they are barely detectable.

A thin but durable frame of the rooflight can help to ensure that they meet the needs of a conservation plan and is in keeping with the sleek design of the roof.

**2. Roof pitch**
As mentioned above, the pitch of the roof can be a significant consideration when installing a rooflight. A low pitch (roof angle) can mean that the water does not run off with ease. As a result, more standing water on the roof can lead to water ingress, and the seams around the rooflight can cause capillary action to draw water into the roof construction.

The most successful rooflight installation will be in properties with a significant roof pitch. Ideally, a pitch would be above fourteen degrees as capillary action is more likely in an angle less than this.

If you have a low roof pitch, then it is still possible to install rooflights. However, it becomes more important to opt for rooflights with a thin profile to prevent the build-up of water around the frame or head of the rooflight. You can also help to mitigate the risk of water ingress by installing a gully around the rooflight to improve drainage and reduce the amount of water that flows over the top of the rooflight's surface.

**3. Width And Seams**
Another key consideration is the width of the rooflight. Naturally, many property owners appreciate large rooflights that let in as much natural light as possible. However, large rooflights on a zinc roof can cause issues with water ingress.

A rooflight will typically be installed across seams in the roof. However, the more seams that a rooflight crosses means that more water has to be diverted further. This water diversion can cause puddling or pooling, increasing the risk of water build-up and ingress without the roof materials.

Generally, it is recommended that rooflights should not cross more than three seams in a zinc roof. This is an important design and lighting consideration when working out the maximum width of the rooflights.

**Stainless steel ultra-thin rooflights for zinc roofs**
Stella Rooflight is a designer's favourite for zinc roofing, due to their strong and durable construction and ultra-thin stainless steel profile. Stella stainless steel slim rooflights sit flush against the roof, helping to improve the aesthetics, meet the needs of conservation regulations and reduce the risk of water issues too.

All Stella rooflights are bespoke made for each project and can be designed to fit any size or shape required, with a wide range of bespoke options available.

In addition, much like a zinc roof, Stella's stainless steel rooflights offer unrivalled longevity, and will not rust, unlike mild or carbon steel framed alternatives. A Stella rooflight is the ideal choice to complement a zinc roof application.

To find out more about how Stella Rooflight can help you create stunning bespoke, highly efficient rooflights on a zinc roof, get in touch with our team today.

If you have any questions or require further technical information concerning the use of rooflights in your own project, please contact one of the Stella Rooflight team on 01794 745445 or visit stellarooflight.co.uk ■

# Seeing as others see is key to designing for dementia

Words by Mark Johnstone, Head of Commercial – UK, Middle East and Ireland, Altro

With ever-growing numbers of people affected by dementia, there is expanding evidence showing the impact of the physical environment on their wellbeing. Whilst legislation sets out design principles; in reality, seeing as others see and designing with empathy are key to effective design.

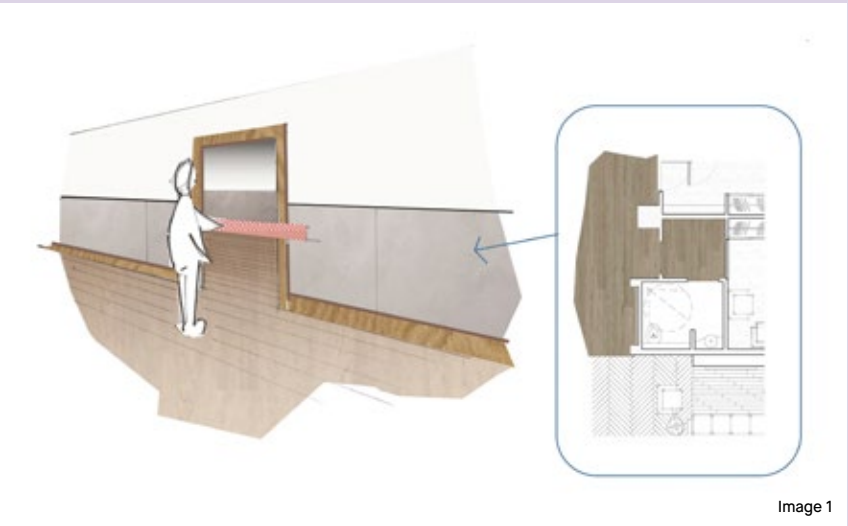


Image 1

There are more than 850,000 people living with dementia in the UK and this is set to rise to over 1 million by 2025[1]. So dementia affects a huge number of lives – all those who live with it and also their families, friends and carers.

The term 'dementia' describes a host of conditions associated with the gradual deterioration of the brain's functions. It affects memory, thinking, orientation, comprehension, calculation, learning capacity, language and judgement. Its causes are various brain diseases, the most well-known being Alzheimer's, which affects nearly two thirds of cases.

With the introduction of legislation and expert guidance for designing for dementia over the past few years, care homes and healthcare environments are becoming more aware and applying best practice principles more often – after all, 70% of people in care homes have dementia or severe memory problems[2] so this is extremely relevant for them. However, when you consider that two thirds of people with dementia live in the community[3], and not in care homes, it is clear that better understanding of these issues throughout the whole design sector is needed to change the way people with dementia are engaged with in the environments they live.

For many years, Altro has worked to develop products to offer those designing for dementia a choice of suitable, practical and effective solutions. Altro works with several partners, all directly involved in improving the lives of those living with dementia. One of these is the Dementia Services Development Centre (DSDC) at the University of Stirling, who Altro worked with when developing new shades of Altro Aquarius to ensure carers and those with dementia can be safer in wet environments, and when developing the colour palette for Altro Suprema – solid, non-sparkle colours to avoid confusion.

The DSDC is the world leader on the design of services and environments for people with dementia, and believes that "Design is about more than shaping the physical environment to counter the impairments which come with dementia. And that "Understanding such impairments is the first step towards creating living environments which support the needs of older people and those with dementia, keeping them safe from dangers such as falls, which can have a devastating effect on an older person; allowing the freedom and confidence to use their abilities to the fullest extent, in all things from the mundane to the creative; aiding memory in day-to-day living; and reinforcing personal identity."

Altro's latest CPD on designing for dementia shares learnings and recommendations developed through this work, and focuses on empathetic design: understanding how dementia affects those living with it, what that looks like to them and why and how you can make improvements through design choices, and meet the legislation and guidance for dementia design.

The Department of Health's Health Building Note 08-02 – Dementia-friendly Health and Social Care Environments, was published in 2015 and is still current. It outlines design principles to aid design of new build and redevelopments and incorporates expert research and guidance from the DSDC and The Kings Fund amongst others. Within this there are twelve design principles, such as 'Provide a safe environment', 'Support wayfinding and navigation', and 'Provide optimum lighting and contrast'. This is where 'seeing as others see' becomes highly effective, and for that we must understand more about visual impairment.

Visual impairment is experienced by many people as they get older – it is not an issue exclusive to those with dementia. However, dementia can add to the challenge of living with these sight changes, or someone's eyes may be healthy, but their brain has trouble interpreting what is seen[4]. According to the RNIB, sight loss is often under-diagnosed in people with dementia because one condition can mask or be mistaken for another.

Visual impairment often means lower contrast sensitivity, poorer colour vision, less spatial awareness and poorer perception of depth. It can lead to misperceptions – when a person sees one thing as

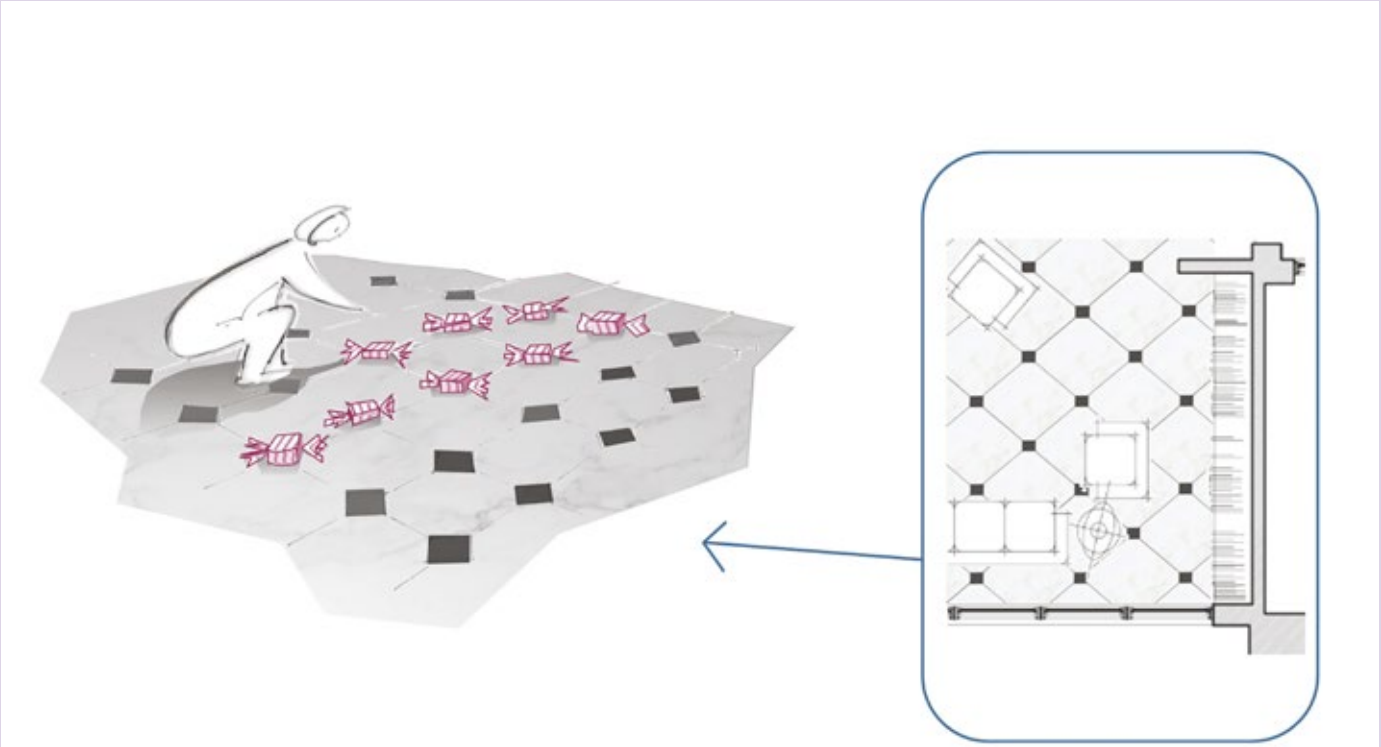


Image 2

something else, for example mistaking a coat hanging up for a person – and disorientation – for example misinterpreting reflections on shiny walls as an intruder. Visual impairment also affects the way we see texture.

Altro's Designing for Dementia CPD uses practical examples to demonstrate the impact of design decisions. Let's look at image 1. What works well in this room is having a consistent flooring or floor tone, as this encourages a person to go through into the next room. Consistent flooring doesn't attract attention. Use consistent flooring materials and finishes across areas where those with dementia should be encouraged to move freely – a day room to an activity room, for example. However, the choice of skirting in this example is problematic, as when viewed from another room it could give the perception of a barrier, as it does across the door in this example. Additionally, the floor in this image is shiny, making it appear wet – it should be matt.

When looking to achieve a homely, non-clinical feel, it may be tempting to opt for patterned flooring, but as image 2 shows, someone with visuo-perceptual difficulties may mistake the pattern for objects to be picked up or to be avoided, and in doing so could result in a fall. Similarly with wall coverings, heavy patterned wallpaper could be picked at and damaged.

Although a lot of the guidance around design for dementia considers visuo-perceptual difficulties, acoustics and sound also play a part. In fact, dementia affects, and is affected by, all of the senses. For example, some studies have shown that people with mild to moderate hearing loss are more likely to experience memory and thinking problems. The effort it takes to hear and understand things diverts brain resources away from the ability to process, respond and remember the information being heard.

Disorientation and bewilderment are a common experience for people with dementia – this is exacerbated by noisy communal and activity spaces, repetitive sound and noise transfer to bedrooms. People with dementia need environments that are easy to interpret first of all. They need rooms that are easy to read because dementia can lead to confusion, and they may lose the ability to accurately interpret what they hear because of hearing loss[5].

Designing with empathy can make a huge difference to the everyday life of people living with dementia. Seeing the world through their eyes allows you to drastically improve understanding and make better assessments and recommendations.

There are many more practical examples like these in the new edition of Altro's designing for dementia CPD, along with guidance and best practice examples and solutions, based on years of experience and real-world applications. The CPD has been designed to be interactive, promoting discussion with those taking part around the growing challenge of creating spaces that work well for those with dementia. There is also a new CPD on sound reduction which also encompasses elements of design for dementia from an acoustic perspective. To book a session, call 01462 707604 or email cpd@altro.com. ■

**Designing with empathy can make a huge difference to the everyday life of people living with dementia.**

[1] https://www.dementiauk.org/wp-content/uploads/2021/04/DUKFS13_What_is_dementia_2021_online.pdf
[2] https://www.alzheimers.org.uk/about-us/news-and-media/facts-media
[3] https://www.who.int/news-room/fact-sheets/detail/dementia
[4] https://img1.wsimg.com/blobby/go/d4716cd3-2ba7-4f17-9d64-e3577c45cd81/downloads/Talking-sense.pdf?ver=1595543200019
[5] Acoustic Bulletin (Ecophon)

# Counting carbon to secure a more sustainable future

Words by Andrew Stolworthy, Director of Product and Market Development, SFS

Sustainability has never been higher on the social and political agenda, but for designers and specifiers, there is an even greater challenge. The buildings now being planned or developed will stand for generations, meaning that the choice of what products to use is critical to the future of the built environment.

This is particularly acute when it comes to the amount of embodied (sometimes called embedded) carbon in building products. This is one of the key battlegrounds in the debate around sustainability and climate action – and something that needs to be clearly understood.

**Understanding embodied carbon**

Embodied carbon refers to all the carbon produced during the product's life – which is not always easy to determine. A lot of the carbon you cannot see is locked in products, buildings, and infrastructure. The embodied carbon of these items come from more than just the materials used to build them.

When calculating embodied carbon in the industry, it is important to consider the carbon footprint of manufacturing processes as well as the materials used to create the product. Carbon emissions from the production of raw materials are part of the equation, as are those from shipping and transportation. In some cases, even assembling the parts into a finished product contributes to that product's carbon footprint.

Understandably, embodied carbon in the built environment represents a significant portion of greenhouse gas (GHG) emissions and is a key challenge for the built environment sector. GHG emissions from the built environment can be divided into two categories: operational carbon – attributed to operational energy consumption during the building's lifetime – and embodied carbon. Approximately 40% of energy related GHG emissions are driven by generating buildings, while 11% is generated from manufacturing materials, according to the Carbon Leadership Forum.

**Identifying embodied carbon**

For designers, specifiers and contractors, it makes sense to prioritise products with lower carbon footprints – and we are seeing more and more evidence that clients are asking for detailed information on this.

Likewise, political and legislative pressure will increase – from framework agreements requiring proof of sustainability, to any new initiatives likely to emerge from the 2021 United Nations Climate Change Conference, also known as COP26.

The key question is: how can the carbon footprints products be effectively defined to include accurate information on embodied carbon?

Construction products environmental product declarations (EPDs) have become a growing source of

environmental data. These are increasingly being used both in assessing buildings' environmental performance and in comparing products for procurement decisions later on in the construction process.

However, identifying and purchasing low-embodied carbon products can be challenging because of a lack of data quality and the lack of transparency of EPDs.

Currently, the UK has no formal regulation regarding embodied carbon emissions, despite construction of new buildings and infrastructure accounting for more than 10% of the national total of emissions. The campaign group ACAN (Architects Climate Action Network) is demanding the introduction of regulatory legislation in line with countries such as France, Finland and the Netherlands.

Likewise, Part Z – a lobby group comprising designers, structural engineers and sustainability experts – is seeking a new section to be added to the building regulations requiring compulsory whole-life carbon assessments.

**Getting verified**

Such game-changing action will take time. Until then, it is vitally important that designers and specifiers can at least understand the carbon footprint of the products they choose. That is why manufacturers must start, if they have not already, attaining verified environmental product declarations (EPDs) and confirming that their products comply with European Standard EN 15804.

This Standard, already a common requirement for many buildings at specification stage, describes the technical performance of the product through its life cycle, from raw materials through to manufacturing, construction, usage, maintenance, refurbishment and ultimately disposal.

Having a verified Environmental Product Declaration (EPD) means that designers and specifiers can trust the provenance of a product – notably what is in it, and how it has been made – to quantify the amount of embodied carbon within it.

The advantage of the verified mark for designers and specifiers is that it provides independent proof of the product's sustainability, supporting compliance with Part L of the building regulations. For the manufacturer, there is the clear benefit of the product being recognised as fit-for-purpose from a sustainability perspective, thereby helping them to meet customer demands and specifications.

Yet there are additional advantages to complying with

**Having a verified Environmental Product Declaration (EPD) means that designers and specifiers can trust the provenance of a product.**

European Standard EN 15804. Knowing how much embodied carbon is used by a product provides a benchmark for future improvement, to support innovative, more sustainable product development. Likewise, the data serves as a guide towards potential cost reductions in energy, transport or manufacturing processes, as the manufacturer spots opportunities to reduce embodied carbon.

**Making a difference**

It is for all of these reasons that SFS has signed up to the BRE's EPD scheme – as well as being part of the UN Global Compact and support the principle of introducing Approved Documents to cap embodied carbon emissions on all major construction projects.

We are now implementing the BRE's online measuring tool, LINA, which gives us access to best-in-class EPD methodology. This ensures there is a hard scientific basis behind the calculations of embodied carbon, bringing transparency back into the supply chain as well as driving product innovation making more sustainable choices. We are currently in the process of getting our NVELOPE® subframe systems verified and will then roll out to other SFS products.

EPDs are but one of several measures we've adopted to help our customers make more informed choices about sustainability.

For example, The NVELOPE® Project Builder service for rainscreen subframes systems is an online tool available to building designers and specifiers that calculates all necessary considerations in a project's initial planning stage. This not only allows for automated calculations of general building areas but also provides all component guides and list prices, NBS specifications and 3D modelling of thermal point loss areas.

Partnering Project Builder is our thermal lite tool. This calculates U-values, identifies sources of thermal bridging, and offers specific, tailored guidance on reducing thermal performance gaps due to cold bridging – in turn, making a positive impact on building sustainability.

These tools are all available through SFS' ConnectSuite®, an online portal that hosts smart tools and apps like product selectors and visualisers to streamline specification and design processes – making the transition to digital integration as seamless as possible.

**Securing futures**

Regardless of legislative change, the benefits of knowing how much embodied carbon there is in building products should be obvious. Designers and specifiers want only the best for their buildings – and any definition of best must include sustainability in its criteria.

Whether by helping those designers and specifiers to make more informed choices today, or by challenging ourselves to think differently about how we source, manufacture and transport products, we are excited by the possibilities. We are invested in knowing where our products go and how they interact throughout the whole lifecycle of the building – and, consequently, to see how we can make positive changes, even small ones, that will impact on the built environment

Measuring embodied carbon is just the start, and we are already on the pathway to other digital technologies such as BIM digital twin capabilities. There is still much to be done though, which is why we are actively engaging with industry partners and bodies such as Construction Excellence. Plus, we have joined initiatives such as the Construction Innovation Hub Platform Project, which is working to identify, refine and develop solutions that can be deployed at scale, across multiple projects and sectors, to realise greater efficiencies and making positive change in terms of sustainable construction.

At SFS, we believe in securing futures, and this scheme helps us in that goal. After all, today's building plans are tomorrow's homes, offices, shops, hotels and hospitals. To secure those futures, the work starts right now. ■

# The Code for Construction Product Information (CCPI)

Words by Rob Firman, Technical and Specification Manager, Polyfoam XPS

September 2021 saw publication of the Code for Construction Product Information (CCPI), following a consultation process. The Code has been prepared by the Marketing Integrity Group (MIG), an industry body set up by the Construction Products Association (CPA) in response to Dame Judith Hackitt's report *Building A Safer Future*.

The Code is aimed at manufacturers of construction products. It sets out eleven clauses that, when the Code is implemented, will need to be met in order for a manufacturer to be deemed code-compliant.

The intention is that, by meeting the eleven clauses, a manufacturer is demonstrating their commitment to providing the industry with product information that meets five tests: clear, accurate, up-to-date, accessible and unambiguous.

**Should design professionals be familiar with the CCPI?**

At the time of writing, the CCPI has been published including details of the assessment process. Assessors are being recruited, and manufacturers have been invited to express their interest in signing up. That means manufacturers cannot yet claim to be compliant, and design professionals cannot yet choose whether to work only with manufacturers who have the CCPI 'badge'.

The big question is whether the CCPI will make a difference to how you find and use product information.

The Code is being heavily promoted to manufacturers, with suggestions that organisations risk being 'left behind' if they do not adopt it. They are also being told that having the Code badge will help them to stand out.

If the aim is universal adoption, then design professionals could eventually be in a situation where there is nothing to distinguish between manufacturers – which is not really any different to the situation now, where nobody has a CCPI-style accreditation. In that case, the determining factor will remain your individual experience of interacting with a manufacturer, and whether you feel confidence in them and their product.

At present, we would anticipate the biggest visible difference being that product information – especially in written form – is likely to be presented in a different way. Exactly how different will depend on each individual manufacturer and their current approach to providing information. Will manufacturers *need* to be accredited in order to do better?

**How are product manufacturers responding to the CCPI proposals?**

As soon as the consultation version of the CCPI was published, some manufacturers – including ourselves – used it to begin reviewing internal processes.

That review included examining the flow of information through different departments, in addition to reassessing the content of published materials.

In that sense, the CCPI has already proved useful. Multiple factors will dictate whether this translates into a formal assessment against the Code, however.

The MIG promised that any necessary changes would be made to the CCPI in response to the consultation, but the published version came out just weeks after the consultation report. Any changes seemed to be minimal and did not seem to address legitimate concerns that were raised at the consultation stage.

According to the consultation report, design professionals who responded to the consultation seemed to be broadly in favour of the CCPI. However, it was interesting to note the number of responses that centred on manufacturers offering specific types of information – especially around sustainability and environmental impact.

The objective of the CCPI is not to make manufacturers provide all of the information that design professionals and specifiers want or will find useful. It is to give reassurance that the information they do provide meets the five criteria set out by the Code.

The consultation suggested there is a demand for information on sustainability that is not currently being met. Wouldn't manufacturers be better off investing their time and money in providing transparent information to meet that demand, such as in the form of environmental product declarations (EPDs), over pursuing CCPI accreditation?

**Will the CCPI succeed?**

There are plenty of examples where 'having a badge' is demonstrably a good thing, and designers and specifiers respond to it. There are also examples of schemes and accreditations that, however well intentioned, simply do not resonate with the intended audience.

While there was undoubtedly support for the CCPI during its consultation, it is not clear whether it was mainly from people and organisations who closely followed its progress because they were aware of the Code and already responding to the idea positively. There were also justified questions and concerns which the consultation response and published version arguably have not answered.

Will the CCPI succeed? At this stage it is too early to tell.

The real acid test will be acceptance from product information users – including design professionals. For manufacturers to adopt the CCPI badge over the long-term, there will need to be demand for it. In particular, product information users will need to be willing to act on possible breaches, including engaging with the infrastructure that is set up to support monitoring and enforcement.

Polyfoam XPS provides extruded polystyrene solutions for ground floor and flat roof build-ups. Visit polyfoamxps.co.uk for technical advice and to subscribe to our monthly newsletter, *The Build-Up*. ■

# Giving heritage properties a contemporary edge without losing their integrity

Words by Simon Castle, Managing Director, Chisholm & Winch

Working on any building is a privilege because every property is much more than bricks and mortar – it is an environment where people will live, work or spend their leisure time. And when the project involves a heritage property, constructed with the craftmanship and tradition of a bygone era, there is even more of a responsibility to do justice to the original building.

Updating heritage buildings to create a legacy for the future is about much more than protecting our history and the aesthetics of traditional architecture. Heritage refurbishment also delivers sustainability goals for reducing waste and extending the service life of existing property assets. The Royal Institution of Chartered Surveyors (RICS) estimates that 35% of the lifecycle carbon from a typical new build office development is emitted before the building is even opened, and that figure rises to 51% for residential properties. Consequently, transforming existing assets preserves both our built and natural environments.

The challenge is that most older properties were not constructed for 21st Century tastes and lifestyles. If they area to be practical, sustainable, attractive buildings for the modern era, there is a delicate balance to be struck between conservation and upgrading, balancing preservation with innovation. Respecting the quality and history of a heritage property doesn't necessarily mean turning back the clock to bygone tastes or rolling back standards of comfort and technology a hundred years or more. For many buildings, sympathetic refurbishment means keeping the character and structural integrity of the existing building, while updating it for a new generation of use with a new generation of construction materials, techniques and technologies.

At Chisholm & Winch, our goal is to balance respect for the past with a clear understanding of what is needed to protect a heritage property for the future and make it appealing for today's occupiers. Whether working on a residential property or a commercial building, those goals must be central to how we approach buildability choices and specification.

**Residential refurb**

What people want and expect in a home – especially at the luxury end of the market – has changed dramatically over the past century. Lifestyles have changed too, so the facilities occupiers expect, and the ease of maintenance they need, are a far cry from the way our ancestors lived.

A good example of a project that has combined traditional conservation with contemporary upgrades is 1-2 New Burlington Street. Located just off Regent Street, between Mayfair and St James's, 1-2 New Burlington Street is a five-storey Regency house that has undergone a major conservation and refurbishment project to provide luxurious private rental accommodation. Our remit was a varied package of works, which involved updating the accommodation to provide chic interiors and contemporary facilities, while restoring original features.

Some of the rooms within the building have original Georgian timber panelling and our remit included refurbishing these walls, matching new timber panelling

to the original where replacement was required, and restoring those areas that could be preserved.

One of the showpiece elements of the project was a new staircase that curls through the centre of the property. Here, new balustrades and bannisters in-keeping with the period of the building were installed to create a feature that does not pretend to be original but instantly references the period of the original build and appears at home in its surroundings.

Oak floors throughout the building marry traditional materials with contemporary tastes, and bespoke joinery across the luxury kitchen, custom-fitted wardrobes, spacious wine cellar and heritage doors echoes the workmanship of the original building while updating it with contemporary style.

Installation of veneered bathroom pods within the existing structure give the bathrooms a contemporary twist. The concept here was to retain the integrity of the original building fabric while creating the luxury feel of a contemporary five-star hotel bathroom. To achieve this, freestanding vanity units were installed to deliver a solution that is both modern and practical. The unit acts as a room divider and, while its contemporary design juxtaposes with the heritage surroundings, its materiality connects it to the existing building.

Meanwhile, a free-standing bath avoids any plumbing in the walls and continues the contemporary theme while also evoking a sense of the free-standing bathing of times gone by.

**Commercial upgrades**

There are many high street buildings that are no longer suited to their original purpose but have architectural value. These properties have the potential to be given a new lease of life in a way that will help to reinvent urban centres and reinvigorate communities. With the downturn in high street retail, there is an urgent need for innovative thinking in these environments.

A current Chisholm & Winch project is a good example. Combining conservation of a derelict former temperance hall with a new build extension, the project is turning a piece of Lewisham's history into a new community hub for the Tab Church.

The building has already undergone several reinventions during its lifetime. A tea hall in the 1920s and a snooker hall for several years, it had been left to decay for the past four decades before The Tab took it on. With water seeping through the roof, some of the structure was compromised so the task of refurbishment has involved making-good the original structure, modifying the building for a new purpose and preserving features that connect the property's history with its future.

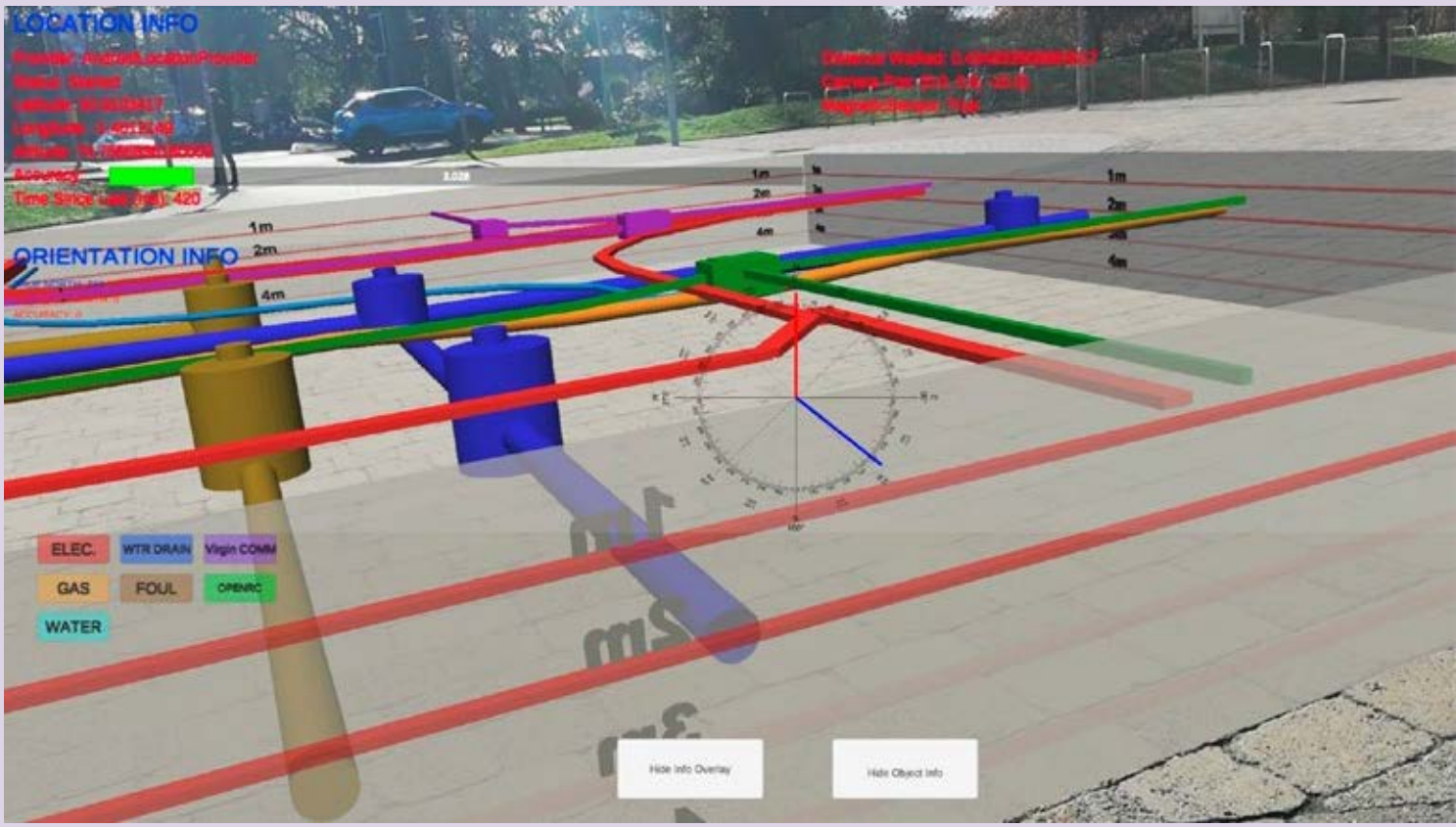
The new build elements will bring contemporary community spaces and office areas to the site and much of the refurb will also deliver contemporary facilities and aesthetics. When finished, the main hall will include a state-of-the-art auditorium with a dramatic, walk-in baptism pool, a new mezzanine level and underfloor heating.

The new additions are being delivered with respect for the original building, however. For example, bespoke steelwork makes the Grade II listed building more structurally robust, while providing a feature that is in-keeping with the early 20th Century building. A rooflight installed at the apex of the restored roof's pitch will allow natural light to flood the previously gloomy space, using a contemporary feature to showcase the craftsmanship of the original building. And of course, restoring original features and carefully selecting materials to connect old and new is integral to the aims of a project like this, so the roof has been stripped and re-built. New trusses and insulation have been installed to ensure the building is robust and delivers 21st Century thermal performance, while the old trusses have been restored and reinstated as a decorative feature and the original slates have been re-used wherever possible.

Due to the dilapidated state of the building when the project commenced, the commitment of both the client and Chisholm & Winch to retaining the building's authenticity has involved pragmatism from the construction team. For example, in order to preserve an original scroll detail, a gable wall was moved back one gridline into the footprint of the building to enable construction of a new brickslip external wall while retaining the feature. Decisions like this may add layers of complexity to the build but they also ensure that upgrading the heritage building adds to its legacy, without detracting from it.

**Collaboration supports success**

At every stage, collaboration between the client, the designer and the construction contractor ensures that decisions made during the refurbishment of a heritage building capitalise on opportunities to both preserve and improve the property, while tailoring the accommodation to its contemporary use. Whether the building is residential or commercial, heritage refurbishment is not about creating museum pieces, but about delivering our future built environment without destroying our past. ■




# Can Chartered Architectural Technologists leverage XR in a post-pandemic world?

Words by Alex Judd MCIAT, Chartered Architectural Technologist, HNW Architects

Following the shift to a virtual work environment, brought on by the pandemic, we have been more reliant on technology than ever. The extended reality (XR) industry is growing, yet its use in architecture is still few and far between. In truth, XR is ready to be adopted by even the smallest of firms and is by no means a new technology – dating back to the 1960s. So, what is causing this low uptake and how can this technology be leveraged?

**Common barriers**

One of the main barriers to the adoption of this technology is the perception that it is essentially visualisation, requiring a high skill set for the production of hyper-realistic content. Although this can be true, nowadays XR is far more accessible and tackles more than just 'Arch-Viz' content. XR can be an excellent learning tool, providing safe, cost-effective means of training. This is achieved using a principle called gamification: combining gaming principles with non-gaming concepts help reinforce the users understanding and knowledge.

As an example, we have researched gamification principles by developing a virtual reality (VR) application that teaches the user how to juggle. By slowing down the movement of the balls in VR, the user finds it much easier to make the connection between the juggling pattern and the physical movement required to do so. After some time in a headset, the user was able to juggle for longer outside of the headset than they originally could when they started. When this principle is applied to elements of buildability or high-risk site activities, vast improvements can be made to safety procedures as well as understanding the construction principles involved.

Another obstacle for the adoption of this technology is the premise that it is an additional cost for the client. Above all, if you expect the client to pay for XR

experiences, it will never be used. Instead, see it as an investment, long-term for your clients and short-term for your own company. It is worthwhile noting that R&D credits may offset the cost of this technology, that is the client does not necessarily need to step into a VR headset for your company to be using VR on a project. Model discrepancies such as proportions, aesthetics and clashes are far easier to spot in VR than on a monitor. Eventually, as confidence is built up in its use internally, a transition to client focused XR is much easier to ascertain.

**Post COVID-19 pandemic**

Despite these common and ongoing barriers, a recent challenge has arisen in a post-pandemic office environment. How can XR be leveraged in a workplace where staff may not be present? In the most general sense, there are three types of offices: working from home, full time at the office or a split between, each of which requires a unique XR strategy.

For an office that works primarily from home via remote services, the focus is on making XR as accessible as possible. Mobile XR such as augmented reality (AR) and three degrees of freedom (3DOF) VR can be an excellent launchpad. By utilising staff's existing smartphones, very little additional hardware is required, and collaborative AR experiences can be set up with ease. In the instance where site visits may be challenging, panoramic/360 degree photos can capture site progress and be reviewed using even the most basic cardboard-style viewer. The same principles can be applied to showcase completed projects to potential clients that may also have a smartphone and are based in a home office.

What these AR experiences constitute is very much dependant on what the company wants to achieve. For instance, we have previously developed a location-based AR underground utility application to allow site teams to collaboratively interrogate complex urban infrastructure networks. Our research concluded that applications such as these were promising for data interrogation and providing an understanding of the site but may not be suitable to make high risk decisions from.

Conversely, when all staff are based in the office, more rigorous XR experiences can be established. Mobile-based XR is limited in that it lacks the depth and clarity that a six degrees of freedom (6DOF) VR experience can provide. Given there is a budget to do so, establishing VR workstations can allow staff to quickly jump into a VR experience with minimal set-up or experience required. Despite this, it is often the case that these workstations are under-utilised. Promoting the software with scavenger-hunt-style games using the workstation can help encourage its use while also allowing the user to familiarise themselves with the system. For more mature VR experiences created in software like game engines, this can also be a good way to showcase new mechanics and features that become added as your system develops.

Recently, we have developed a VR design-decision application using a previously mentioned game engine software, specifically Unreal Engine. Teachers could immerse themselves into a typical classroom and make informed decisions on aspects such as furniture, lighting, and classroom layouts. The resultant data could then be shared with designers to aid them in the design process. By involving the user at these early stages of design, the intent is far clearer, and designers can design more efficiently and more effectively.

For those that are split between the office and home, budget dependant, there is no reason why you cannot do both! It may be that if the office space is solely used for meetings, then the VR workstation is integrated with a meeting space. Or if you are spending more time on site than in the office, then AR visualisations and walkthroughs may be the way forward.

**Conclusion**

When reflecting on your XR strategy, it is important to consider the following items. Primarily, what are your drivers? Are they external client-led requests for VR experiences to be included in your work package, or internal technology advocates that can see a benefit in its use? If there are no clear drivers, but something you fundamentally believe you should be doing, it may be worth allocating an XR champion to steer the strategy, or otherwise a set of principles to build from.

**If you are spending more time on site than in the office, then AR visualisations and walkthroughs may be the way forward.**

Even if the drivers are primarily client led, focus on its use internally first. If your colleagues are struggling to use it, it is most likely that your clients will find it challenging too. This approach is a great way to get immediate feedback and measure your XR strategy as and when it progresses. As this internal confidence is built up, start looking into making investments into XR technology. Focus on 6DOF untethered VR and LiDAR enabled AR hardware, complemented with game engine software, or fully featured XR software development kits.

The key word here is measure. Although the technology is there, the industry is still warming up to it, and it is likely that teething problems will occur along the way. Even if your work stays the same, the technology will inevitably change and that could shift your strategy significantly. Constantly review your strategy and underline the key lessons learnt to stay ahead of the curve. On a final note, more so than anything, have fun with it! Gamification not only reinforces knowledge gained, but it also makes the experience enjoyable. Meetings become less dull, collaboration becomes natural, and the design process becomes enriched.

MAVRiC (mixed augmented and virtual reality inter-connected) is an independent not-for-profit group that focuses on addressing this disconnect between XR and the AEC industry. Consisting primarily of Architectural Technologists, our principles are cemented in supporting companies looking to adopt this technology with advice and guidance, utilising research and development initiatives. ■

# Mitchell's Construction Series 1881 – present day: the preservation of construction knowledge

Words by Professor Steve Scaysbrook FCIAT, Chartered Architectural Technologist

A reprint of the 1906 issues of the Elementary Course, Advanced and Honours course together with a specific 40 plate reproduction of construction drawings used in the two books.

University of Westminster Archive, taken from their copy of *The Polytechnic Portrait Gallery* (1894), ref. UWA/RSP/5/1/92

**A spotlight on the 1906 edition**

Ever since the initial issue of the Mitchell's construction books in 1881 by Charles Frederick Mitchell, (the photo here is one of the few taken of him), no other book series has a continued presence in the built environment sector. For almost 140 years, students and practitioners have referred to both the First Stage or Elementary book and the more detailed Advanced and Honours copy as the stand-alone references to construction detailing and materials.

Through a prestigious career as a lecturer at The Polytechnic Institute, Regent Street, London, which became known as the Regent Street Polytechnic, and finally Westminster University, Charles F Mitchell (1859-1916) was the senior lecturer. His older brother Robert Mitchell CBE (1855-1933) was head of the school.

Together, with his younger brother George A Mitchell, they embarked on an almost 30-year project of writing, updating and modifying what became two separate construction books, the First Stage or Elementary and the expanded Advanced and Honours series, published initially by Batsford, and later Routledge.

The series grew from the initial single volume in 1881, as the First Stage or Elementary course, (an electronic version of the first issue can be viewed online at the Reese Library California University) to a two-volume issue in 1893/4 and expanded very quickly from two books into a collection of support issues by specifically qualified authors, dealing with structure, environment and services and components and finishes, with a specific issue of 40 plates of the detailed drawings used in many of the releases, with other more specific books on carpentry and bricklaying, offering a complete cross discipline guide to construction technology.

> **The series grew from the initial single volume in 1881, as the First Stage or Elementary course, to a two-volume issue in 1893/4**

The book series was originally aimed at students attending the Regent Street College, but quickly spread with the current editions aimed at those studying construction technology as part of a qualification route to a degree level attainment and above.

Mitchell continued the development and updating of his series till his death in 1916. His younger brother George continued his legacy and continued to expand and correct the series until his death in 1953. From then on, several industry professionals took over the helm updating and adding new content.

Many of the older books are still available as hardback paper versions found on many booksellers lists who deal in older books and other specific collector book sites. Their importance to the built environment sector as a description of construction practice at specific points in history is now beginning to be appreciated to modern-day professionals as they prepare to update or simply repair existing buildings from the late 1890's through to modern day.

Over the past year, I have amassed a collection of both First Stage or Elementary and Advanced and Honours issues. The issue numbers of the two separate books titles do not correspond to each other with updates to the First Stage or Elementary editions being slower than that of the Advanced.

The control and use of many materials used at this period differ in both the way they were made, and installed, to the site practice of the time performed in a different way to that enjoyed today. The main purpose of this electronic issue is to make current designers aware of these differences and the perhaps the climate enjoyed internally being different to the warm and often humid internal space we now seem to enjoy.

The weather of 1906, although not that dissimilar to 2021, should be considered as over a 100 years of continual warfare against the materials, changing them in so many ways from the mortars used in the often-solid wall construction, and mostly none insulated environment. The weather together with heating provided via an almost room by room basis with coal fires, released sooty smoke that smothered big cities and coated buildings in soot and city grime, further adding to the alternative weathering

The Mitchells series of books from this period give both an understanding of design and construction for this period, but also showing the way to upgrading and or repairing historic structures, which demands an understanding of the manufacture of the materials used at the time, their installation and even more important, the ageing of the individual material over the lifetime of the building. This is individual to each project, and its position in the building, internal or external and its orientation to the sun.

Although this reprint is dedicated to 1906, each edition offers a similar insight to that particular period of construction history, showing materials and construction of that age, offering professionals a unique timeline of material development and construction technology. The current rewrite, due in December 2021, will make reference to linking back to the complete timeline and offer ways to refer to specific editions, to repair, extend and enlarge heritage construction buildings to modern living without compromising the architecture, materials and construction.

There is no simple heritage material list to consult, each project being distinct and separate from any other. This will mean a detailed survey of each, and every element, to establish a baseline, with sensors employed to collect data on a timeline. Destructive testing is not normally an option in heritage buildings, so electronic scanning and data collection and analysis, should be the way forward, collecting as much data as possible on the materials used from thermal to density to moisture content and solar orientation.

Modern-day CAD programmes with their inbuilt ability to add data to any element, or component, should be the repository of the scanned data, often as embedded data within the model or as is the case in walls, data collected on a grid format to suit the element and saved typically within a spreadsheet. Graphical programming using Dynamo or grasshopper will be useful to analyse the data and understand the effects of time, weather and orientation.

Electronic scanning and data collection from embedded and external sensors will play an important part in any historic refurbishment project, allowing a vast amount of data to be collected. The use and integration of the data will allow designers to run scenarios to establish the true nature of the living building materials, establishing almost micro spot data. As sensors add new data the historic buildings internal environment can be adapted, or any required maintenance drawn to the clients' attention, drawing attention to a failure and outline corrective measures to prevent any damage.

Modern-day electronic linking via wi-fi, blue tooth or what is becoming known as the internet of things (IoT) will allow this vast array of data to be linked to the servers without the need for internal wiring. Power required to run the sensors can be a combination of live wire feed, traditional battery for external sensors, and or backscatter technology for embedded sensors taking power from the atmosphere itself. This later technology developed by MIT will be discussed at length in updates of the current series.

The opening up of this vast literary repository to researchers, will enable further understanding of the effects of life, use and weather as a comparison to many other heritage buildings.

People also have a dramatic effect on any building, from just touching and leaving their scent, and grease, staining the external skin of any material, although this patina, should have little effect on the building's performance; it is a historic link to the past and should be preserved. This is in direct contrast to the deposits of an industrial age with soot and grime from so many open fires and industry, coating buildings with often acidic deposits, that will erode the fabric of the building, and help in its decay. This should be removed, but not until the structure and materials of the building have been analysed and understood.

Throughout the life of any historic building, the actual use of the building might change from a gentleman's residence to office accommodation or a commercial outlet such as a shop. The original building being designed with open fires as its main source of heating, with a cool if not drafty environment. Later being converted to a more updated gas central heating and radiators and windows and doors sealed to prevent drafts. Changing the environment and that of the construction materials which must alter to suite the new inhabitants and use. So often the cause of cracks in the masonry and timber alike, from excessive drying.

The explosion of distinguished buildings for large corporations and businesses after the death of Queen Victoria, and the arrival of Edward VII left behind a legacy of architecture which Charles Mitchell would have been

**The simple act of making a scale from a drawing with only one dimension may be lost to modern-day students, but not to Charles Mitchell.**

well aware of, working in the centre of London amidst the ongoing construction of so many notable buildings. Certainly, his 1906 advanced and Honours edition reflected this in the constant revisions made in previous editions (made on an almost yearly programme) both in the written text and the addition of so many well-drawn technical details which expand the detail described.

It is this area of technical drawing that so many of the modern-day designers fail to understand relying upon modern CAD to draw with and communicate the desired detail, little realising the constraints CAD puts upon free-thinking. It is of no surprise to see Mitchell's First Stage or Elementary editions starting with a detailed explanation of the instruments and methods of drawing with pencil ink and tracing paper; emphasising the need to learn basic drawing skills and the need to think about a detail and the materials used to create a detail capable of lasting well over 100 years or more. The simple act of making a scale from a drawing with only one dimension may be lost to modern-day students, but not to Charles Mitchell, who describes the method and its use.

To preserve the ideals of the book and make it available to researchers, and student and professionals, a sample year, 1906 has been chosen to represent the invaluable information contained in this unique series, with the preservation of the hardbacked paper versions as a facsimile hard backed paper edition and a digital scan to enable search and note taking in a modern digital programme, by professionals who will use this series as a reference in research on specific topics of construction used in a specific time frame.

1906 was a year of great upheaval, Edward VII was on the throne and he was embarking upon and encouraging a huge building programme across, not just the UK, but within the (then) global British Empire at its height with industry, pouring out goods to the world, many of which are still in existence and used as they were original designed all be it with modern updates.

Although the European political environment was in turmoil with the build-up to the 1914-18 war. Edward VII ushered in a new style of construction and elegance, with buildings of immense importance in London, such as Admiralty Arch (1912), Australia House (1918) and the Central Criminal Court (Old Bailey) by Edward William Mountford being built, with similar properties being erected in this period around the UK and abroad in the British Empire. Classic examples such as the Central Railway Station, Sydney, Australia, the Birkbeck Building, Toronto, Canada and the Ripon Building, Chennai, India. Together with many local town halls, civic buildings and notable manufacturers like Alfred Bird who built his then, modern factory in Digbeth, Birmingham.

Mitchell successfully includes many of the details, materials and concepts used during this global expansion of classic Edwardian architecture, in this 1906 edition. Later editions of Mitchell's continued this legacy of updating and expanding the series to its current nine volumes and taking into account new materials and methods of construction and technology advancement.

Many similar books have been created, all trying to fill in gaps left by the series, but never surpassing the continuity and depth of the Mitchell's series that offers such a detailed insight into construction techniques and materials for the whole of the 20th Century and into the 21st Century, from the original 1881 first edition to present day. The complete series offers an unprecedented insight into construction covering over 140 years of construction development.

The current nine books, see the Routledge website, are being updated and expanded to take account of new construction methods, and above all the transition to computer aided design (or CAD) and its development in the communication of the design via BIM. Also how data and sensors in the industrial 4.0 period will aid the buildings use, and help owners run and maintain both their heritage and more modern buildings far more efficiently, against an ever-changing global climate.

With the help of the digital scanning and preservation of the existing hard-backed paper books It is also the intension of the new authors to incorporate and provide electronic links to past issues to expand the students understanding of construction through history, based upon the 1906 editions.

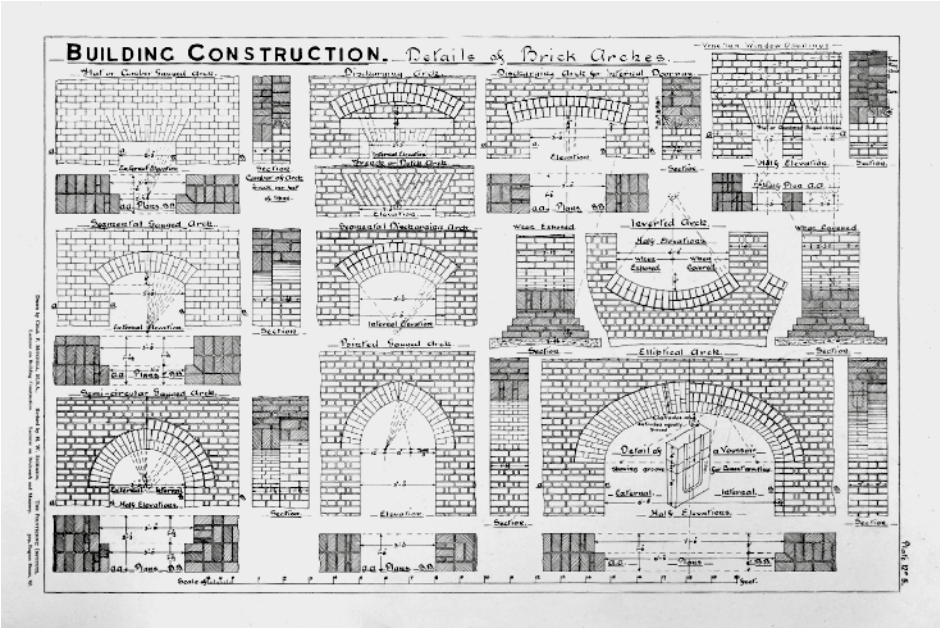
The Mitchell's 1906 First Stage or Elementary and Advanced and Honours editions will add a valuable aid to building pathology, allowing students and practitioners to research construction methods and materials pertinent to the period

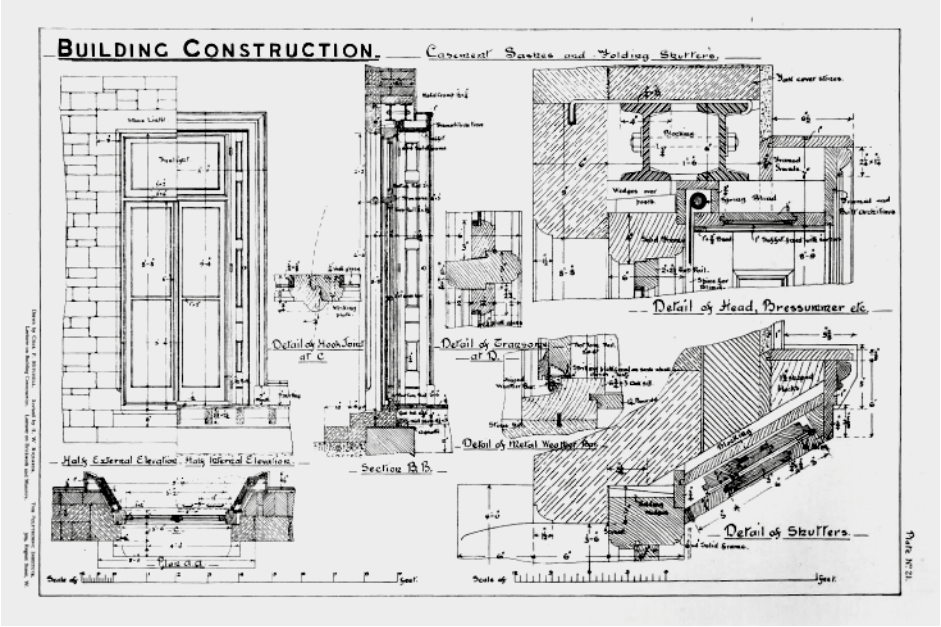
An electronic scan of the original 1906 edition allows a true issue of the original as a paper facsimile, PDF and ePub electronic book. This final electronic issue will allow new sections to be added, from external academic research papers dealing with historic construction, via links and reference to the electronic documents, as a stand-alone issue. With a new preface expanding the use of the 1906 version to modern researchers and students, the scanned issues, as well as being linked to the new construction series. The readers own research notes can also be added via readers such as Calibre, and personal knowledge programmes such as Obsidian. The Calibre electronic ePub reader has a rich toolbox to aid adding notes, together with an ability to read almost any format of the electronic document.

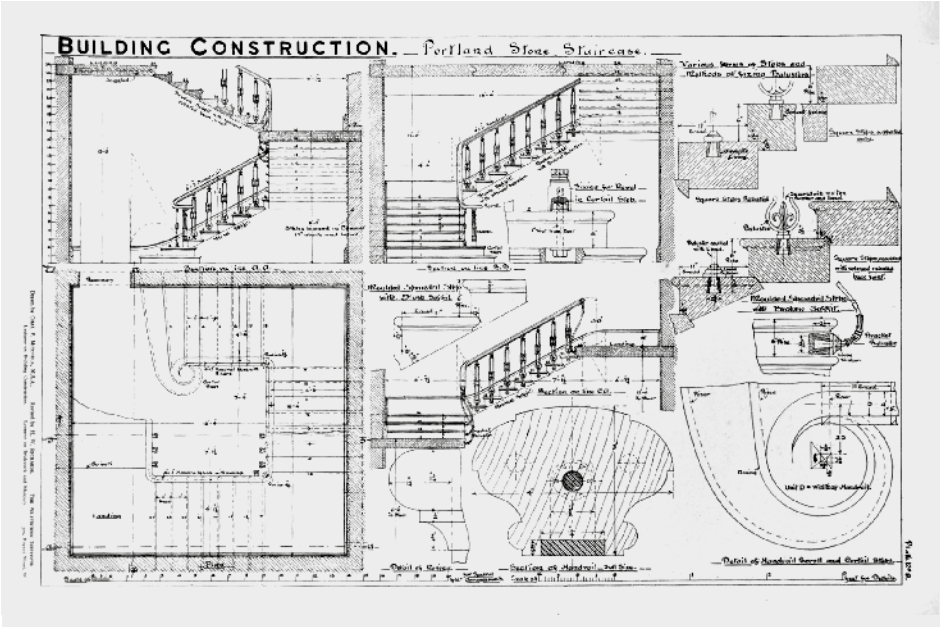
The interlinking of the current nine books in the series now establishes a cross-platform of information linking details together with CAD, material data, BIM and its benefits to construction with a specific section in each book detailing the links to older versions of Mitchell's looking at construction for the period and methods of integration into modern construction.

To apply the lessons learned from the 1906 books, it is wise to try and visit some of the buildings that were designed and constructed during this period. There is so much for students and professionals to appreciate, from the elegance of the design to the detailing, that is still in current use, and never been touched. Has it survived, and worked as originally intended, have alterations been made to replace or repair?

Observation is a skill, that is so important to surveying so much can be observed and noted, sketching trains the mind, and forces the observer to take time in looking at the detail, Photos are an easy route out, and offer clarity, but sketching offers so much more. ■




**Top:**
'Details of Brick Arches' drawing from Charles F Mitchell's Building Construction

**Middle:**
'Casement Sashes and Folding Shutters' drawing from Charles F Mitchell's Building Construction

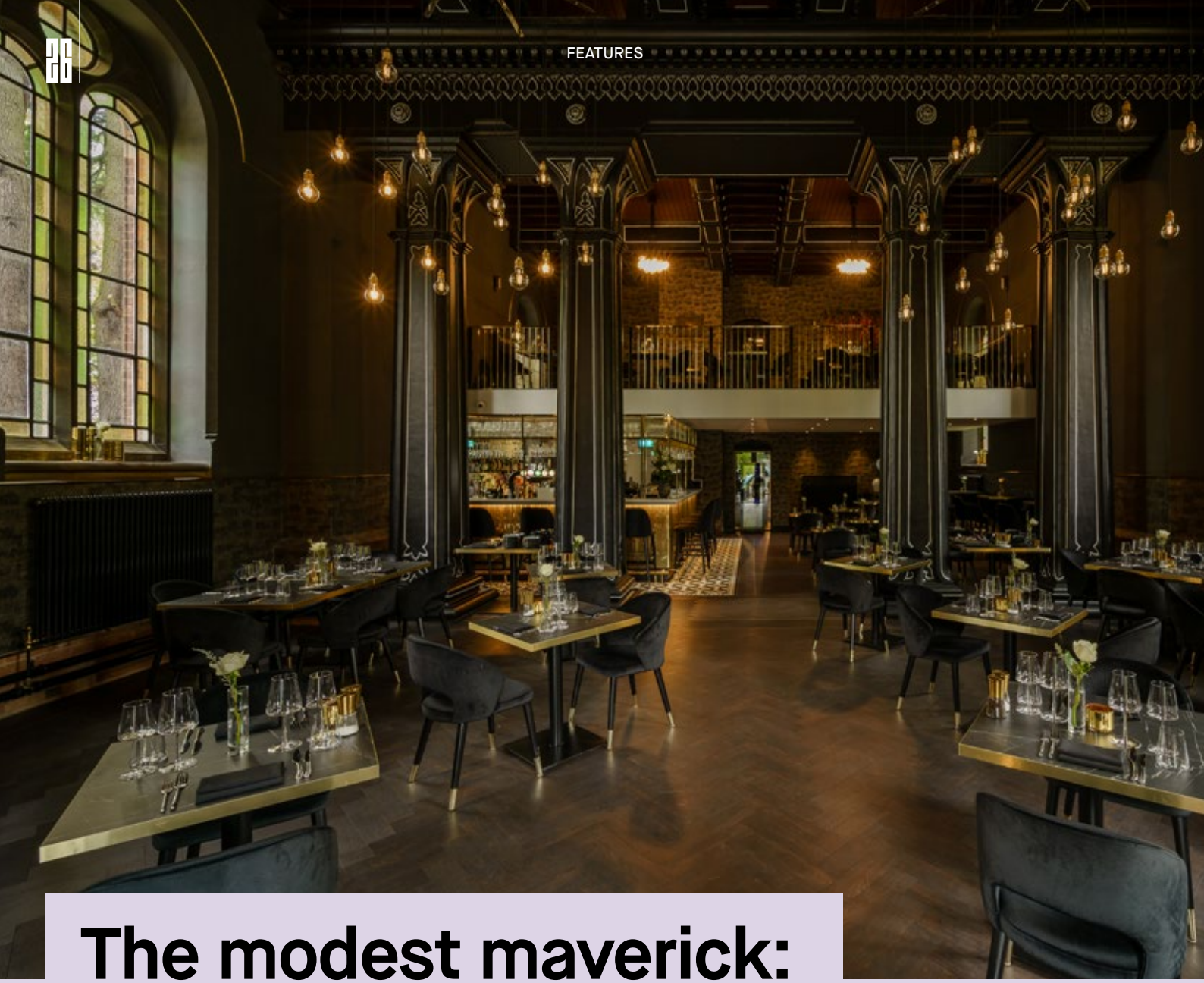
**Bottom:**
'Portland Stone Staircase' drawing from Charles F Mitchell's Building Construction

**Copies of the books and drawings can be obtained the Routledge website with the following links:**

https://www.routledge.com/Mitchells-Building-Construction-and-Drawing-1906/Mitchell-Scaysbrook/p/book/9781032199047 (ISBN for both Volumes 1 & 2) 978-1-032-19904-7

https://www.routledge.com/Building-Construction-and-Drawing-1906-A-Textbook-on-the-Principles-and/Mitchell-Scaysbrook/p/book/9781032199061 Ebook ISBN: 978-1-003-26147-6

https://www.routledge.com/Building-Construction-and-Drawing-1906-A-Textbook-on-the-Principles-and/Mitchell-Scaysbrook/p/book/9781032199641 Ebook ISBN: 978-1-003-26167-4



# The modest maverick: A refreshing approach to architectural design

Words by Ronnie Harris, VJH Marketing

When the new owners of the Grade II Listed former Pumping Station situated in Bestwood, Nottinghamshire met with Chartered Architectural Technologist, Daniel Lacey MCIAT, they could never have anticipated the roller coaster ride that was ahead of them.

The first thing you notice when speaking to Daniel, along with his talent and love of his work, is his modesty.

Since forming his own architectural and interior design practice in 2013, Daniel's desire is to design and deliver buildings not only for their intended purpose, but importantly (and often overlooked) for the people who are going to use the buildings. That was true at the beginning of his career and is even more relevant in the projects he undertakes today.

His passion for playing a key role all the way through a project, from concept to delivery, has led to Daniel and his team being heavily involved on their most challenging venture to date. Ever the opportunist, Daniel took a chance, when pitching to the owners of the lakeside renovation project, to design and present a full scheme with broad concepts of the use of the building, showing visuals that brought those concepts to life. His foresight paid off and Daniel's involvement with the project became pivotal to the success of the development.

**The project**

Now known as Lakeside, this Grade II Listed building was the former Bestwood Pumping Station situated in the outskirts of Nottingham. Dating back to the mid-1800s, the pumping station provided clean water to the people of Nottingham until the mid-1960s.

Richard Berridge and Amy Harrad of Newera Partnership Limited purchased the building in September

2019 with a vision to re-create the beauty of the original Victorian architectural style whilst committing to zero compromise on the quality of the refurbishment. The owners' ethos was for Lakeside to be inclusive and a destination for the community. Many of the suppliers and manufacturers were based in Nottingham, which in itself created a Lakeside economy.

Daniel shared the vision of the owners, recognising this to be an opportunity to showcase the heritage of the building. The former engineering use of the building lent itself to the industrial elegance style of refurbishment. The working features are highlighted throughout the building along with fresh and innovative use of modern materials and designs. Most noticeably, the building is cleverly designed to create super flexible areas, accommodating the multi-purpose venue to host events of all sizes, together with two fine dining restaurants, a bar, two mezzanine levels overlooking the event space and a viewing gallery in the Tower, offering stunning views across the Nottinghamshire countryside.

Following his original pitch to the client, Daniel says, "I think from that moment, we developed a close level of trust as they could see my concept aligned closely with their own ideas and vision for the building and business, and our ability to deliver the project. I often had to make crucial decisions to keep the project moving, particularly as much of the development took place during the Coronavirus pandemic. I suppose that could be considered risky as a business owner, but I always had a good reason for any decisions. Having such a good relationship and trust with the client was key.

I also had so many more ideas beyond the original concept which hadn't been considered or even deemed possible. The client bought into the fact that we were just as excited as them, and not only allowed me to be creative but pushed me to be creative. In fact, Richard said to me not that long into the project, "What I liked about you guys, was that I felt that you were talking about this building as if it was yours." They liked the fact that we took ownership and responsibility for the project as well."

Accessibility, functionality, and exquisite, high-quality materials are key elements of the design and refurbishment, thus forming a strong Lakeside brand. From the overall layouts to the bespoke, elegant staircases and through to the unique architrave profiles, Daniel and his team maintained the superior level of detailed design throughout. By his own admission, Daniel loves the architectural elements of interior design so the attention to detail on this refurbishment project are second to none, restoring this historic building with the dignity and creativity it deserves.

**The future**

What does the future hold for Daniel Lacey and his team of super mavericks?

"Personally, and as a business, we're not afraid to challenge the norm. In fact, the challenge is finding the right approach for the project, and not the expected approach. This includes collaboration with partners to combine knowledge and experience. Clever design solutions come out of a strong relationship between client and the design team.

Someone once said to me that we seem to have developed a bit of a unique style. It was never intentional or contrived, I just approach every project in its own context – financial, environmental, social context – every project is different."

> **The challenge is finding the right approach for the project, and not the expected approach.**
>
> "

Daniel and his team are keen to challenge current thinking on building sustainability and reshape the relationship between design corporate practices. Social sustainability and economic sustainability are key elements to factor into design surmising if a development is economically sustainable, it stands more chance of enduring long term.

Similarly, with social sustainability, the world changes increasingly, so with every generation, there's a shift in dynamics and the way we live. Architectural design needs to challenge traditional thinking to support a broader and more competitive environment.

Daniel concludes, "Over the last few years, I've started to think less about what kind of projects we want to do and more about what kind of business we want to be. My focus is on how we approach our work with clients and who we are. I truly believe that the right projects come along that align with our business and our values. And I think that's starting to show." ■

# The Mercury Theatre

Words by David Shipley MCIAT, Chartered Architectural Technologist

Following two degrees in architecture, I decided to focus more specifically on Architectural Technology. Over time, I have quietly worked on various building projects through the small architectural practice I was employed at before moving into the public sector with Colchester Borough Homes. Here I became involved with the 'Mercury Rising' project; the extensions to and redevelopment of the Mercury Theatre in Colchester. Here, I took my design and technical knowledge, having achieved a Master's degree in Building Conservation, and led the architectural design for the project.

**Background**

The Mercury Theatre, found in the town centre of Colchester, Essex, was built in 1972 and has since, provided a focal point for the local community with its popular arts and entertainment scene. The unusual form of the building has led to its distinctly recognisable design which attracts a variety of acts who visit and perform at what is a popular and well-supported venue within the local community.

The building is locally listed and is situated within a prominent conservation area in the town centre. The Theatre is surrounded by the Roman town wall and Balkerne Gate (both scheduled ancient monuments), the Grade II Listed Colchester Arts Centre (formerly the church of St. Mary-at-the-Walls), the Grade II* Listed Municipal Water Tower (known locally as 'Jumbo') with a variety of Grade II buildings and other locally listed buildings and structures nearby.

**Architecture**

Architecturally, the Mercury Theatre is a contemporary building with an unusual form that does not easily lend itself to extensive refurbishment and alteration. This is due to low floor-to-ceiling heights and an exposed concrete structure that result in limited opportunity to add new services or make alterations without impacting on the structure. As such, a detailed study of the building was undertaken where the initial concept was developed to both utilise the existing building where possible, complementing the unusual architectural form in addition to creating a new chapter in the life of the theatre.

The two most significant characteristics of the building (and the most identifiable) are the prominently positioned angular form which originally contained a first-floor bar area; and secondly, the flytower which provides a local landmark when viewed from a distance. Whilst the flytower would not be affected by the proposals, the metal crittall windows to the strong angular form provided a vertical rhythm found elsewhere around the building. The verticality of the smaller architectural details helps to offset the otherwise elongated building which as a result of previous extension works and bland architectural forms originating from the early 1970s design, has gently spread out into the site and remains largely hidden by the Roman Wall and in places, dense treeline.

**Business model**

To enable the theatre to meet audience expectations, provide access for all and ensure financial sustainability, significant development was required. This was seen as

achievable by developing the extra front of house facilities to provide an ancillary income, generated from improved bars, catering, merchandise opportunities, thus ensuring the theatre's long-term viability. This would be coupled with new rehearsal spaces (saving on current rental of premises off site) and technical improvements backstage to support the high-quality programme to match the improved facilities out front. This combined approach creates more income per audience member and increased revenue from the greater number of visitors attracted to the improved theatre building as a whole. Audience development will result from improved customer comfort/user experience, daytime usage and increased community and educational use.

Following extensive consultation with the theatre, this model which has informed the design, reduces the operational difficulties of the current arrangement; and most importantly provides a range of facilities that will further increase the production quality of performances and allows third parties to hire spaces for their own artistic development.

**Proposal**

Recognising the eclectic mix of architectural forms, styles, materials, textures and colours, it was generally felt that a new chapter in the life of the theatre could be achieved by further adding to this varied palette. However, it was also important to provide a more harmonious link with the existing building that would look to preserve, if not enhance the quality of the conservation area the building is situated in. Consequently, a predominantly timber-clad production block that appears to rest upon a more substantial brick ground floor level, was seen as an addition that can stand in its own right but also complement the existing building.

The varied functions and spaces required by the theatre, have produced a series of internal volumes that generated an overtly 'blocky' building style which would have been in danger of dominating the site had the separate materials between the ground and upper stories not been employed.

The reforming of the northeast corner and infill of the current porte-cochere at the northern end, help enhance the overall appearance of the existing building with the majority of glass-based interventions providing an uplift to the rather tired appearance overall

As the design brief has demanded from the outset, the business case that the theatre has produced requires a sustainable model that will allow the theatre to thrive in the future. To that end, the modern studio spaces and associated facilities required for an up-to-date theatre, have seen the south end of the site fully utilised that will unlock the full development potential of the site.

The infill of ground floor area at the northern end will enhance the external appearance and provide much-needed communal space within the current footprint of the building. The demolition of the existing restaurant will also see a new extension in its place which provides a more rationalised arrangement on the corner of the building.

As the layout of the building has developed, an arrangement was ultimately produced that lends itself to the hiring of individual spaces without compromising privacy and security of the remainder of the building. This arrangement provides, a well-organised series of spaces that creates a more efficient operation of the whole building.

The new spaces being created by the theatre require the rehearsal studios in the new production block to be hired out separately and therefore have to remain separate to the existing building. Reordering the communal spaces for the front of house areas will also improve these tired facilities and enhances the theatre goer's experience before, during and after performances. Whilst the mass of the production block is subordinate to the existing building, the apparent scale of the extension has been condensed by the choice of materials used to reduce the visual impact of the building. The individual volumes of the interior spaces have informed the varied roofline of the production block, which has been embraced as an architectural style in itself.

**The individual volumes of the interior spaces have informed the varied roofline of the production block, which has been embraced as an architectural style in itself.**

The box office extension that replaced the former restaurant, aligns itself with the existing profile of the building whilst creating a strong visual statement that identifies the entrance area.

**Landscaping and ecology**

The quality of the surrounding historic environment has informed a simple, yet functional landscaping scheme. The retention of the historic ramparts that abut the Roman wall and provision of pedestrian access around the site, help promote the theatre building in this significant conservation area, whilst increasing its connectedness with its neighbours and visitors travelling into and around the site. Level access has also been incorporated where possible around the building to provide a more inclusive environment for all users.

Architectural lighting identifies focal points around the site, whilst ensuring the theatre itself stands illuminated in the centre. The infill of the porte-cochere and with it the removal of vehicles, will enhance the quality of the immediate external space surrounding the building.

This will provide a more positive and exclusive pedestrian link for those arriving via the nearby car park and will also serve to significantly increase the quality of the public realm.

**Materials**

In wanting to achieve a subordinate extension to the main building, it was important to reduce the apparent scale of the production block which occupies a large part of the available site to the south. To that end, a variety of materials were considered which help achieve this reduction in scale, but also positively contribute to the makeup of the surrounding area.

The prominent use of timber cladding for the production block, helps reflect the surrounding woodland area and provides an appropriate material that also benefits from sustainable characteristics. Specifically, the dense grain of the Siberian Larch was felt to offer a robust solution without the need for additional preservative treatment nor create a future maintenance liability. The ground storey utilises handmade brickwork which provides a more substantial base level to the extension, whilst providing a sympathetic response to the surrounding historic environment where brickwork is employed in a number of buildings and structures including the scheduled Roman Wall.

> **The ground storey utilises handmade brickwork which provides a more substantial base level to the extension.**

Glass is used extensively for the infill section to the porte-cochere and the box office extension to the east elevation. The use of glass in these areas helps to provide a sense of openness internally and engagement with the community by providing a sense of 'animation' and connectedness between inside and out.

**Environmental design**

Generally, all building elements and services have been designed to exceed the minimum requirements of modern building construction standards. In recognition of this, the design brief also called for the project to be developed and built in accordance with BREEAM and has met a design stage rating of 'Very Good'. This has generally encompassed achieving energy efficiency, water reduction and a higher level of user comfort and wellbeing throughout the building.

Where possible, the building fabric has been upgraded to provide thermally efficient construction that exceeds Approved Document L of the Building Regulations with respect to energy conservation and heat loss. In part, this was achieved by specifying double-glazing; high performance cavity insulation; the use of renewable materials i.e. timber; and the inclusion of efficient modern technologies for heating, cooling and ventilation throughout.

Mechanical and electrical systems have been specified in line with the non-domestic building services compliance guide to ensure high efficiency plant and equipment is utilised to minimise energy usage. This includes replacing all existing boiler plant with new gas fired condensing boilers, all mechanical ventilation plant will have heat recovery capability, limiting the provision of comfort cooling favouring instead, high levels of thermal insulation and natural or mechanical ventilation, and the provision of a building management system to control all mechanical plant and systems.

In addition to the specification of highly thermally-efficient building materials and highly energy-efficient lighting and building services plant, one of the ways that the greatly reduced carbon dioxide emissions has been achieved in the Production Block is via the inclusion of a further photovoltaic (PV) system as part of the design. The existing building already had a 50kW PV system installed with a further 17.5kW system now installed on the roof over the first-floor rehearsal space.

**Archaeology**

Previous investigatory works have revealed that the site is located where one or more Roman townhouses once stood. This is evidenced by the discovery of tessellated and mosaic-tiled flooring, robbed-out walls and the plinth for a former fortress building.

As part of the ongoing consultation with local authority's archaeological advisor and in line with Historic England's guidance on development affected by archaeological remains, a substantial excavation of the building footprint in the development site was carried out ahead of any groundwork commencing.

The design of foundations and sub-structure took into consideration the archaeology on the site, where a watching brief was in place over this phase of construction works. Due to the sensitive nature of the below-ground conditions, hand-digging was necessary.

**Structure**

The three-storey 1,100 sq. metre production block at the rear of the site was particularly challenging given its design was largely dictated by the archaeological

condition of the site. Given the extent of remains discovered and the makeup of the ground itself, a piled-slab design was required that allowed the new extension to carefully navigate the archaeological deposits. Upon this was a steel superstructure, made more complex in its design given the internal clear spans required for the rehearsal spaces combined with cantilevered detail necessary to avoid imposing excessive loads on the existing building where it connected. For this a steel frame with precast beam and block flooring was constructed, to generally provide a self-supporting framework against the existing building.

The front-of-house saw a back-to-back escape staircase core removed, itself formed by an in situ concrete arrangement tied into the surrounding structure. The staircase core was carefully deconstructed to balance loading across the existing building, with more piles added to provide the base of the new bar and café area. With the aesthetic of the existing building generally involving the exposed concrete frame, the addition of suspended ceiling voids and false walls were incorporated where possible to contain and distribute new services throughout.

**Fire strategy**

Given the post-Grenfell climate, the fire-related aspects of the design were always likely to be closely scrutinised and understandably so. The most significant alteration made to the existing part of the building, saw the back-to-back escape stairwell core removed, to open up the ground and first floor areas; the former for the bar/café, the latter for service distribution and new access WC accommodation. Made more complicated given the in situ concrete structure and staircase, this alternation significantly affected how the building could remain compliant for escape purposes.

These staircases previously provided escape to ground floor level, leading directly to the outside. This area was now in the centre of the bar/café area, so even if retained, would likely involve some form of separating lobby. The two main staircases flanking each side of the building were fortunately already wide enough to accommodate the main auditorium at full capacity. However, additional smoke lobbies would be necessary at the foot of these staircases, to provide sufficient separation from the new bar/café area. The angular form of these, constructed with fire resistant glazing, reflect the triangular shape of the bar and as a result, are well integrated into the internal environment.

A detailed fire strategy incorporating escape analysis of the main auditorium was carried out, itself identifying further fire door positions required, given the new extensions also being provided. An L1 alarm system is provided throughout the building, with a detailed management strategy allowing for the 'human factor' which sits alongside all specified features.

On the materials side, steelwork was encased within the building fabric where possible i.e. within the wall depths, with anything remaining, treated with intumescent paint. The timber cladding was treated with flame retardant.

**Accessibility**

Although the existing building did not readily lend itself to significant alteration, we were fortunate that the extent of floor areas were able to accommodate gentle gradients to remove stepped access. Ramps were introduced only where necessary, although the addition of two lifts (in conjunction with the existing platform lift) make the building accessible throughout. Handrails, improved signage and well-lit areas all added to the improved inclusivity of those visiting and working in the building. Most significantly, the number of toilets was increased throughout the building: almost doubling the existing total provision, including twice as many access WC facilities and combined WC/shower facilities.

**Summary**

Whilst the new Mercury has been well received by the public and all stakeholders involved, it is one that will remain particularly special to me. As a regular theatregoer before the project, being involved with it has seen a new lease of life breathed into it. Post-Covid and returning to enjoy performances again, the Mercury demonstrates that the hard work and effort which led to achieving MCIAT status, was worth the effort. Like I said at the beginning, the Mercury has been more than just a building project. ■

# There's no BIM like home Part 13

Words by Dan Rossiter BSC (Hons) FCIAT, Chartered Architectural Technologist

*AT Journal* continues its exclusive access to serialise Dan's blog on how he used BIM to produce an information model of his home.

After looking at how I will be **bridging the attribute gap**, I have now started to finish populating my graphical models to satisfy my graphical and information requirements. However, a practical problem has appeared which I wanted to share you with around type naming.

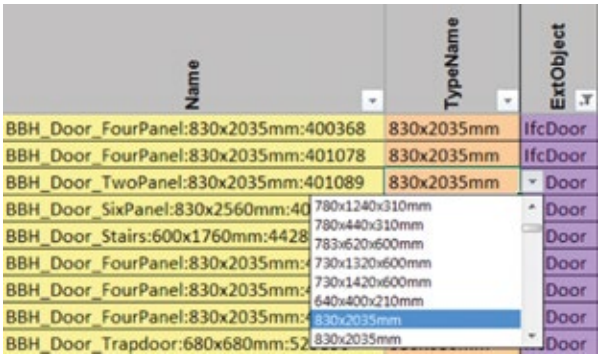
A while ago, I discussed good practice around **3D modelling and object naming**, this related to the file name (*how you would find that file in a folder*) using BS8541-1 to the point that I am able to use pretty effectively name all of the objects (*that Revit allows me to rename*). What we did not discuss is type naming, but put simply an object's type name also needs thorough consideration. However, as I did not properly consider them a problem has been brought to my attention. let me explain.


Shown above are the different door families in my home. Each family has a unique name and happen to only require a single type which I have named following **Revit's guidance** for type naming through using a dimension-based type name. Meaning that the family and types names are as follows:

1. ***BBH_Door_FourPanel;***
   *. 830x2035mm*
2. ***BBH_Door_Stair;***
   *. 600x1760mm*
3. ***BBH_Door_Trapdoor;***
   *. 680x680mm*
4. ***BBH_Door_TwoPanel; and***
   *. 830x2035mm*
5. ***BBH_Door_SixPanel.***
   *. 830x2560mm*

Can you spot my problem yet? No, neither could I at first.

The way families and types work in **Revit** means that an object's type isn't necessarily unique. This isn't a problem in **Revit**, but can be a problem when exported into other tools and systems, such as when I export into **COBie.**



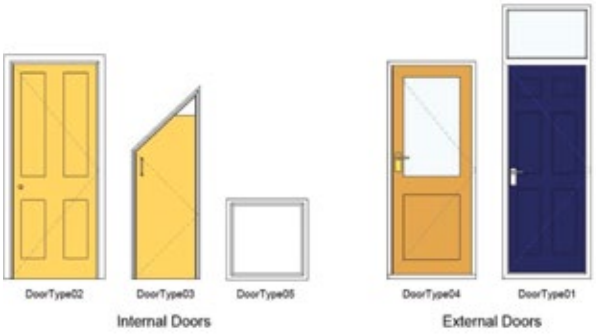

Ideally an objects type should be unique and human readable so that it is clear which object is being referred to. To do so, I can see two solutions:

**Family and type**

The term type can be a misleading one. In **BS1192-4**, type is defined as the named specification for components which means that using 'Revit Speak' both the family and type constitute the object's type. This means that if I could export the object's type as ***<<Family>>:<<Type>>*** I would have a unique reference for each type. However, while this

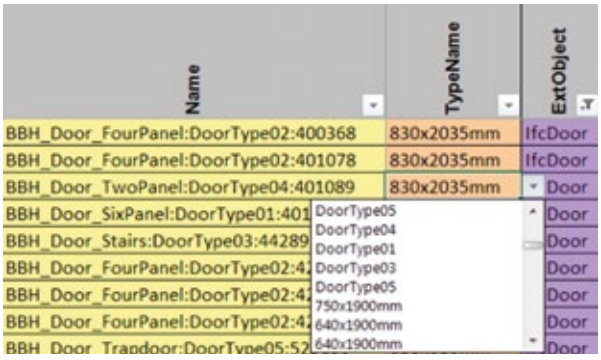
is not supported by the **IFC exporter** it is supported by the **COBie extension for Revit** which solves the problem for **COBie**, but means that there isn't a supported solution for any other exchange method,
such as **IFC**.


**<<Type>>*N***
A more practical solution then may be not to describe the size of the object but instead give it a name that is easier to understand. Both **Revit's guidance** and the definitions within the **IFC schema** refer to what I call the '<<Type>>N' method, for example using a type name such as ***DoorType01*** to describe each object's type. For a scheme like mine (*without any design*) this can be easily applied, but for a more iterative project an issues can occur if a Type becomes redundant during the development of the graphical model.
So lets give it a go.




As you can see, I have replaced all of my dimension-based types with a type description based on the order you would find them in my home.

This method does not change how my doors are set up in my model but provides two advantages. The first is that when this information is exported into **COBie** there is no duplication which means that it is clear which type is which.




There is another advantage too. If a dimension-based type name is used then there is a chance for error due to the manual input as well as the need to update the name each time a change to the object occurs. Using a name such as ***DoorType04*** mitigates these potential issues.

There we have it, by considering how I name my types, each type now has a unique reference that does not duplicate other data and is less prone to error. This means that once I have replicated this throughout my model I will be well on my way to completing PLQ2.5!

Now that I know how to resolve my types it is time to explore my other attributes so that I can capture all my required metadata. But first I want to tell you about my year with Nest.

The **Nest Thermostat** is an electronic, programmable, Wi-Fi enabled thermostat that learns from real-time use to optimize heating. I currently have it installed in 002: Living Room as it is the most frequently occupied room in my home. It has a series of built-in sensors that measure temperature as well humidity, motion, and ambient light.

**How does it work?**
When installed, the **Nest Thermostat** is connected over Wi-Fi to the boiler via an additional device called Heat Link which bypasses the boiler controls.

Quite simply, the big number in the middle is the programmed temperature (19) and the gauge shows the current temperature (21). When the current temperature drops below the programmed temperature the heat link is activated; telling the boiler to run on full. Once the programmed temperature is reached, a signal is sent to the heat link to deactivate the boiler and the cycle repeats indefinitely.


*To be continued in the next issue.*
*@DRossiter87*

# NBS Digital construction survey

Words by David Bain, Research Manager, NBS

The built environment sector is currently going through a period of radical change, while dealing with critical challenges. Past surveys have shown that built environment professionals believe digital transformation is happening now and that digitisation will transform the way that we work. The build up to COP26 has highlighted the enormity of the climate change challenge we are facing and the Coronavirus pandemic has forced us to rethink how we live and work. We wanted to consider digitisation in the context of these changes and challenges.

So, after a decade of conducting the BIM survey, we have evolved and expanded it into a broader survey about digital ways of working. This is not to say that the BIM discussion is over: the BIM adoption journey continues with some organisations further embedding it into their processes, while others are assessing whether it is relevant to them. This is why a significant element of the survey is still about BIM. We felt that now was the time to widen the scope and gain a broader understanding of digital transformation in 2021.

We ran the survey between April and August this year. It was distributed widely using various channels and supported by over a dozen industry bodies, including CIAT. We are very grateful for this support, which helps us to represent professionals from across the industry. In total, 906 people completed the survey. Whilst the majority (64%) are based in the UK, we are seeing an increasing number of professionals from other countries, with 60 countries represented, across six continents.

Fifty-eight respondents (6%) described themselves as Architectural Technologists. In addition, there were 161 BIM specialists (18%), many of whom are likely to have trained as ATs. Almost all ATs are working in practice, mainly architectural, with some multidisciplinary. The majority of BIM managers also work for design practices but there are some at client organisations, contractors and manufacturers. ATs were spread across organisations of different sizes, while BIM managers were more likely to be found in larger organisations. Over 80% of ATs were in the UK or Ireland, while 40% of BIM specialists were actually based overseas. As with many areas of construction, the majority of professionals are male: 80% of ATs, with only 16% female. However, almost a quarter of BIM specialists (24%) are female.

**BIM**

Among all respondents, a solid majority (71%) say that they have adopted BIM, with another quarter saying they plan to do so within the next five years. Only 5% have no intention of implementing BIM. The proportion using BIM has remained fairly steady for the past four years, after a significant period of growth. Adoption among ATs is similar at 72%, higher than the 66% we saw last year. For BIM managers, the figure is, unsurprisingly, over 90%. The narrative about BIM has been gradually evolving, with some describing it as 'better information management' rather than 'building information modelling', diluting the association with 3D models. Almost two thirds of all respondents now describe their approach to BIM as a process following a standard: either the BS/PAS 1192

(33%) or ISO 19650 (30%) series. A third of ATs also follow the BS/PAS 1192 series, although fewer, 23%, the ISO 19650 series. And 40% describe their approach to BIM as working with 3D models, compared to 29% among all respondents. BIM specialists are much more likely to align their approach to BIM with standards: 50% with the ISO 19650 series, 25% with the BS/PAS 1192 series.

*'There is a large disparity even within companies on using BIM and new technologies. We have many staff that are capable and understand BIM and many that do not. The same is evident in consultants and other specialists we work with. It doesn't seem to be that companies are not willing to adopt BIM practices, more that there is an awareness line within companies that is slowly moving through staff..*

Architectural technologist, large architectural practice, UK

There are a number of tasks that should be carried out, or documents produced, to align with the BIM process as set out in the ISO 19650 series. Responses among those who have adopted BIM show that many of these things are happening, although there hasn't been much of an increase compared with last year. ATs appear to be slightly less likely to say these things have taken place on their projects, apart from the use of common data environments, where 61% say they worked on a project that used one in the last year; and information standards (56%). Fifty-four percent had recent experience of BIM execution plans, 39% exchange information requirements and 29% a detailed responsibility matrix.

*'Albeit the design side of the industry is gradually moving to more involved and defined BIM strategies, the translation to construction especially on-site seems a long way off. Significant investment will be required by small sub-contract businesses to accept and actively work from the digital twin etc. All the work creating the Golden Thread for Building Safety and maintenance and operation is useless without the installer working to the design intent in all cases.'*

Architectural technologist, small architectural practice, UK

When it comes to sharing information, there is evidence of an increase in those following the standards, particularly among ATs and BIM managers. Eighty percent of ATs follow a naming convention for all information that is shared, 66% clearly indicate what that information is suitable for and 59% highlight amended information using revision codes. These are all higher than the figures for the whole sample, although the equivalent metrics among BIM managers were higher again. Compared to all respondents, the use of IFC[1] for exchanging information was much higher among ATs (61% compared with 50%). The use of COBie[2], however, continues to be carried out by a minority: 31% among all respondents and 22% for ATs.

We have seen a gradual increase in the use of Uniclass 2015, cited as the recommended classification in the ISO 19650 series. These findings suggest that it is now used more than the other classifications, like Common Arrangement of Work Sections (CAWS). Forty-two percent of all respondents say that it is the most commonly used classification on their projects, rising to 50% in the UK. Forty-two percent of ATs also say they use Uniclass 2015 most often, compared with 26% using CAWS.

So, does this all mean that BIM is now the norm? Just over half (51%) of all respondents and 53% of ATs think that it is in their country. A considerable proportion (around a quarter) disagree, suggesting that it's still premature to describe it as 'business as usual'.

While BIM may not yet be the norm for the industry, one of the things that may help is the provision of information in the right formats to support this way of working. Eighty-one percent of survey respondents (85% of ATs) agree that they need manufacturers to provide them with BIM/digital objects. And many manufacturers are responding, with 78% providing them.

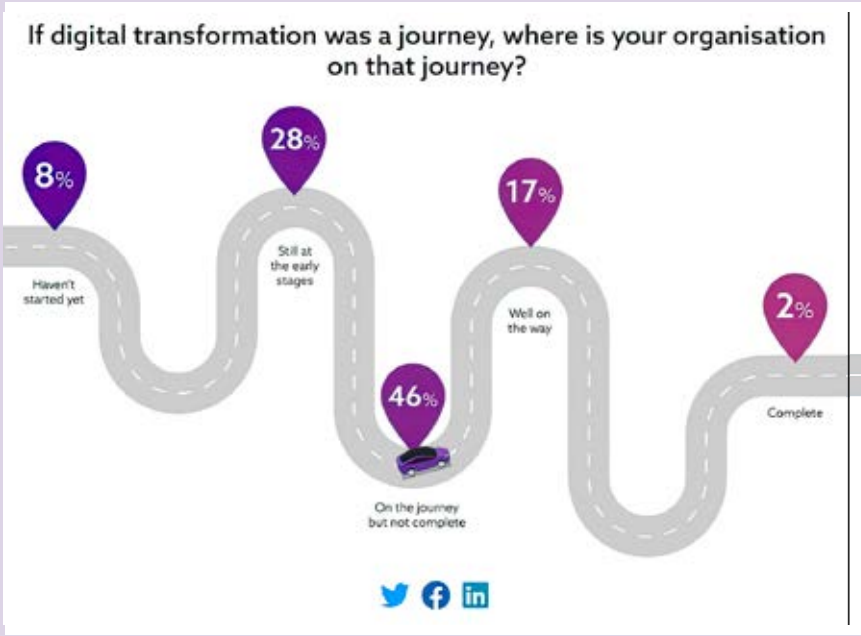
**New technologies**

Most respondents have started on a digital transformation journey. Almost two thirds (64%) say that they've been on this journey for some time, that they are well on the way to completing it, or that they've reached their destination. This compares with 54% in 2018. For ATs and BIM managers, it's higher, with 75% of the former and 73% of the latter at the same stage.

If we look at some of the technologies that people have adopted as part of this transition, we see that the majority (69%) now use cloud computing of some kind; 59% among ATs. This is likely to have been accelerated by the need to work from home during the pandemic. Uses include Microsoft Office 365, common data environments, file transfer software and NBS Chorus.

Twenty-seven percent use virtual, augmented or

[1] Industry Foundation Classes
[2] Construction Operations Building information exchange



mixed reality; 19% of ATs and 47% BIM managers. We have not seen much growth in uptake of immersive tech, which is mainly used for client walk throughs, although many do intend to start using it. The UK Government has been promoting offsite construction and almost half (44%) say they have been part of a project with some elements manufactured offsite: 38% among ATs. Examples include modular pods, such as bathrooms, and wall or floor panels. Digital twins are much talked about, although it's still quite early days, with 14% using them: 9% of ATs and 30% of BIM managers. With all of these technologies and ways of working, most of those not yet using them do intend to or are not sure whether they are doing currently: there is some variation in how these technologies are defined. When asked which will have the greatest potential to transform the built environment for the better, it is BIM that is seen as most significant, followed by cloud computing and offsite construction.

'Cost and complexity is still the major barrier to adoption.' Architectural technologist, small surveying practice, UK.

**Industry changes and challenges**

These changes in the way people work must be for a purpose, otherwise why spend time and money implementing them? So, it's encouraging to see that the majority do believe that the adoption of digital ways of working are helping to create better places (80%), have a positive environmental impact (75%) and create a safer built environment (74%). For ATs the numbers are a little lower at 72%, 66% and 59%, respectively. For BIM managers they increase to 91%, 82% and 85%.

In terms of improving safety, the 'golden thread' of building information is being promoted as part of the solution. Most (78%) believe they need to be working digitally to help realise it and 70% to have adopted BIM. Seventy-eight percent of ATs agree on the point about working digitally, although only 60% agree they need to implement BIM. Just over half (51%) feel they are clear on what they need to do to play their part achieving the golden thread but this falls to 39% among ATs. In terms of the role government are playing, many indicate that it could do more: only 37% say that the government in their country is leading the way on digital, falling to 21% among ATs.

These findings suggest that the majority of built environment professionals believe that digital ways of working are helping to create a better built environment, and that they themselves are adopting these, albeit to a varying extent. Architectural technologists do appear to be a little more circumspect than some, not always as convinced by the merits of digital. For digital ways of working to benefit everyone involved in creating and using the built environment, it is important that we provide the guidance and tools necessary for all to apply it in the way that is appropriate to their situation.

You can read the full report here: thenbs.com/DCR2021 ■

# IG Masonry Support supplies brick slip lintels on Bridges Family Practice development

Words by Darren Laws, Fabrick

Medical practices are at the heart of communities across the world. IG Masonry Support was proud to play an important part in the stunning redevelopment of the Bridges Family Practice, formerly known as Bryson Street Surgery.

The family practice has been a staple of Protestant and Catholic communities for more than a century, and its new moniker is a reflection of the bridging of these two groups. Thanks to significant funding from Landmark East, the Northern Ireland Executive's Social Investment Fund, this vital community asset has been transformed into a state-of-the-art-facility that will continue to serve its people for years to come.

In its new glory, the practice boasts extensive amenities including interview and treatment rooms, children's play and waiting area, facilities and access for wheelchair users and minor surgery capabilities.

**The challenge**

East Belfast residents will recognise the new building has retained one feature – its unique, curved wall with a projecting soffit at its entrance. In order to maximise the visual impact of the wall, funding was secured through the Northern Ireland Executive's Urban Villages Initiative to commission a piece of art for this iconic exterior.

IG Masonry Support, a company which continually meets customers' high expectations in terms of quality, was tasked with crafting a bespoke brick slip lintel that curved with this shape of the building's entrance.

**The solution**

IG Masonry Support's teams utilised their skill, craft and expertise to create a brick slip lintel that accentuated this architectural finish and fitted seamlessly with the constructed brickwork. IG Masonry Support also produced brick slip lintels above each of the windows, which required a brick soffit.

IG Masonry Support's brick slip lintels can be used over small openings to eliminate the need for additional masonry support. Supplied in stainless steel or galvanised steel, IG Masonry Support's brick slip lintels have the same profile as a standard lintel and are delivered to site as a one-piece unit, complete with brick slips attached, eliminating the need for specialist installation onsite. These solutions are produced off-site in a factory-controlled environment which ensures that the bonding process occurs in optimum controlled conditions free from wet weather, extreme temperature variations and excessive dust.

With thousands of installations completed over the past decade, IG Masonry Support's brick slip system is a proven and reliable solution which provides maximum BBA-certified adhesion of the brick slips.

The utilisation of IG Masonry Support's brick slip lintels will ensure the iconic curved wall of the Bridges Family Practice's entrance looks good and performs well into its bright future.

# Embedding digital technology and workflows into the curriculum

Words by Gordon Chisholm MCIAT, Chartered Architectural Technologist, Waterford Institute of Technology

CIAT, in collaboration with Vellore Institute of Technology (VIT), held an international e-conference on the Technology of Architecture – Futures. The conference took place between 29 April – 1 May 2021 and featured a range of speakers from the world of Architectural Technology and architecture with presentations covering industry practice, academia and research on important themes in construction and the built environment. ATJ is pleased to be able to include some of the presentations in the next few pages from the speakers.

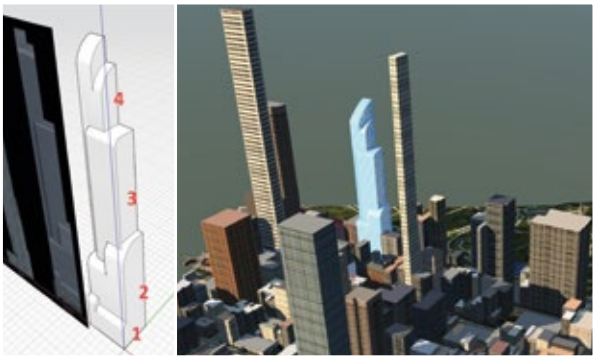
This presentation highlighted some of the digital technologies and workflows that have been embedded into the BSc(Hons) in Architectural & BIM Technology programme at Waterford Institute of Technology (WIT).

Architectural Technology (AT) programmes have their roots in vocational training/teaching. As the skillset expanded and the professional AT developed, the education evolved to Honours degree level and beyond. Regardless of this evolution there must always be a strong academia-industry link at its core to ensure the graduate is relevant to the workplace. As educators we must endeavour to bridge traditional teaching methods/content that we were taught and practiced with emerging technologies and methodologies, which have rapidly become the norm.

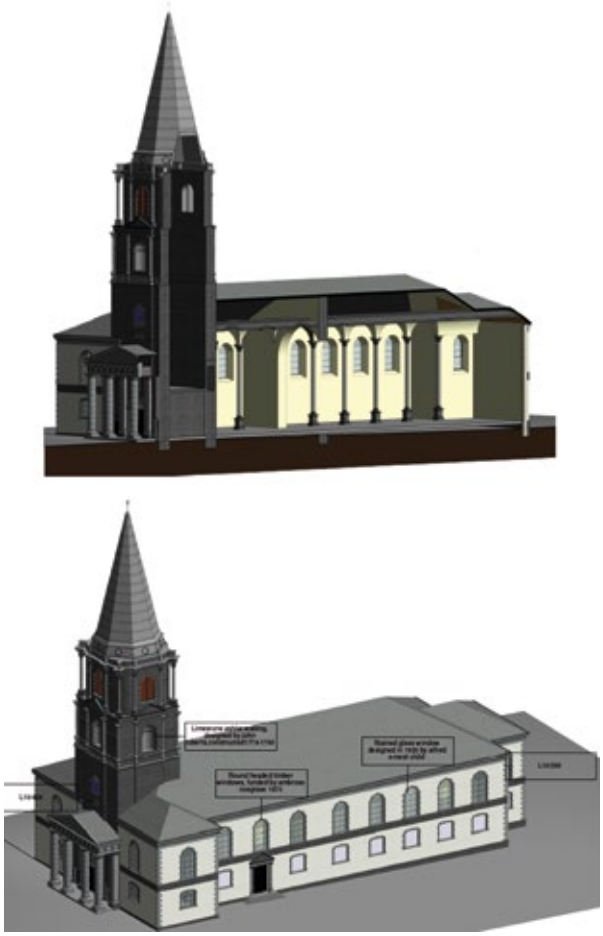
Digital technologies and workflows have always been at the heart of the AT programme at WIT. This is testament to those involved being forward looking and engaged with industry. WIT were early adopters of Building Information Modelling (BIM); introducing Revit in 2007, committing to BIM methodologies and workflows in 2010 and in 2013 rewriting the entire AT programme from the ground up so that the traditional AT skills were taught through digital construction and BIM methodologies placed at the heart of the programme. This not only made the AT graduate relevant for a digital workplace it also placed our graduates in a prime position to take advantage of the emerging roles that BIM was creating; BIM coordinator, BIM manager, Information Manager etc.; over 50% of our graduates do not go into traditional architectural practices anymore.

Creating the new Architectural & BIM Technology programme was not an easy task. Set against timetabling constraints coupled with the introduction of modularisation and an ever-increasing demand on programme content and its complexity. For instance, take Part L of the building regulations where compliance has gone from an elemental u-values to calculating thermal bridging and the use of specialised simulation software. Creative solutions along with streamlining was required. One of the most successful interventions was to incorporate cultural context within digital graphics in the early years of the programme. Examples shown are the study in semester three of famous houses where the student researches and presents on a house, models it within Revit and then creates visualisations. This approach means the student becomes familiar with the intricacies

*Goulding House, Scott Tallon Walker 1972*

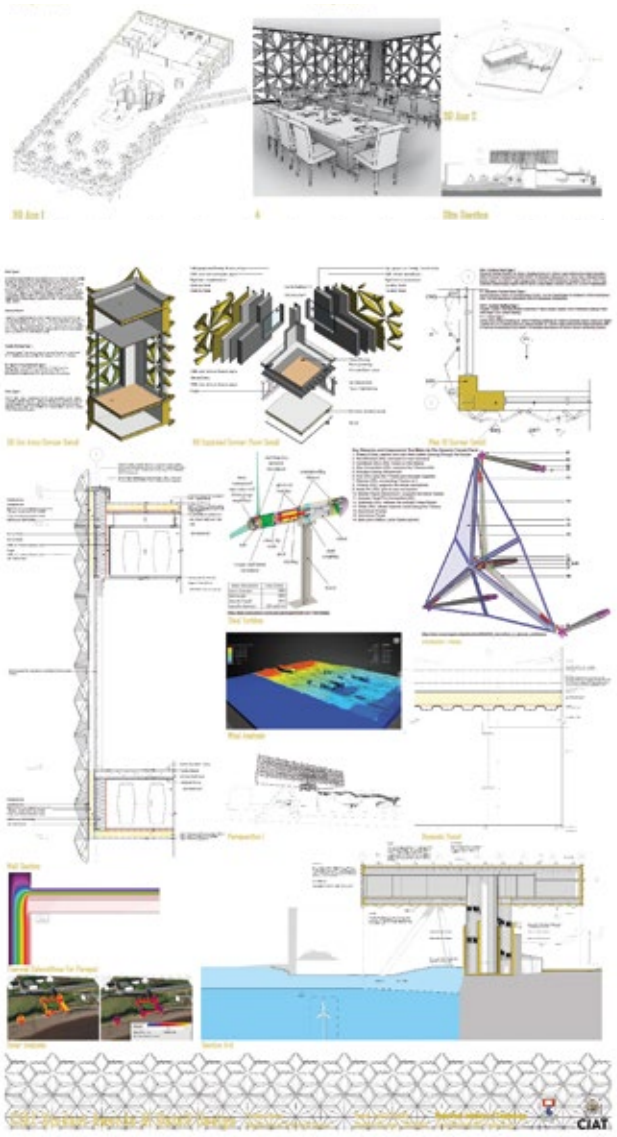



***Left to right:** FormIt Modelling, Infraworks Model New York One57, New York. Christian de Portzamparc 2014*



*Christchurch Cathedral, Waterford: John Roberts 1779*


*Extracts from Construction Collaboration Technologies*



*Extracts from Final 4th Year Project*

of the design and construction in far greater depth than say writing an essay or answering an exam question. This methodology is repeated and expanded upon in semester four where the students explore tall building design whilst learning about conceptual modelling techniques principally using FormIt and Infraworks. They are encouraged to experiment with other software and techniques that interest them. In addition there is an element of fun associated with the project by locating the tower out of context in their hometowns.

In later years conservation modules have been enhanced to take advantage of the digital tools such as point clouds and drawings accompanied with Historic BIM (HBIM). The creation of models from survey and reference drawings that include important records of the building.

BIM methodologies are developed holistically from day one, through all the years and are demonstrated in the final year with a semester long collaborative project of Architectural & BIM Technology, Quantity Surveying and Construction Management & Engineering students working in teams to deliver a project from post tender stage to handover using ISO19650 standards and delivered through BIM360. Collaboration, teamwork, presentation skills are key objectives. Although daunting to start with for many to be involved in a large group project, it has proven to be very enjoyable and successful in preparing the students for industry.

The final fourth year project is a culmination of the knowledge and techniques developed to deliver and justify a coherent and complex project with multiple threads including cultural, design and technology. The project illustrated below was initially the students capstone final year project which was developed as the student's dissertation topic which investigated adaptive facades and their relationship to control the internal environment.

These are some of the methods we have developed to embed digital technology/construction into a traditional Architectural Technology programme. The on-going challenge is to continue evolving and enable the programme to be flexible in order to adapt to new and emerging technologies and ensure our graduates are industry relevant and ready. ■

# A house is a computer to live in

Words by Dr Jon Stinson, CIAT affiliate

The conference provided the ideal discussion space to share ideas, understand synergies and spotlight innovation within the realm of Architectural Technology. The symposium also afforded an international audience the opportunity to share concepts and experiences of smart technologies, with a particular emphasis on material specification and methods of construction relevant to regional climate, skills, architecture and energy efficiency.

This platform provided a stage to present a thought experiment, thirteen years in the marking. One which could allow for the consolidation of efforts across multiple innovation streams, culminating in a domestic dwelling product with an attractive value proposition. Innovation streams linked to: closing the user behaviour related performance gap; smart homes; optimised methods of construction; balanced embodied carbon with operational carbon; enhanced hygrothermal comfort; fuel poverty; and healthy environments.

During the first decade of the 21st Century we were promised sustainable buildings, which were healthy and smart buildings, whilst we received some diluted versions of those three concepts, there are very few examples where all three exist in harmony. Those dwellings that embody the three concepts lack the capability of mass extrapolation to meet the demands of a growing and more technologically savvy population. The difficulties in achieve these concepts lays in the complexity in achieving each individually, and the lack of interoperability between the three with a seemingly impossible way to stitch them together. Can these be woven together through the diverse and multi-disciplinary profession of technology and architecture.

This is where the thought experiment began, and it started with an old adage – a home is a machine to live in, with a slight amendment, which becomes apparent as we moved through this thought experiment.

The term 'sustainable buildings' is used a lot, we use it here with the understanding that it is a combination of the terms environmentally sensitive design and ecologically calibrated construction, multiplied with a time component to described the building's impact on future generations. Much has been achieved by shifting the fuel type for our buildings to electricity, whilst this doesn't address the levels of energy demand, or the costs associated to fuel poverty, it is lowering the built environment's operation carbon demand. However, when is it time for our industry to demand a standardised methodology for evaluating the embodied carbon of our buildings through our design choices and specifications? At the VIT and CITA conference, speakers from the co-called economically developed countries, present eye-watering advancements in digital technology to optimise buildings for sustainability. Speakers from developing countries of the reminded us of the power of locally sourced and home-grown methods of construction and their role within a sustainable building. Can we justify the term 'zero carbon' home/building if the materials travel thousands of miles and the carbon intensity of those materials are three to four times larger than the operational carbon for the entire building?

The term healthy buildings is about to take centre-stage in our terminology for the next decade. It is not a new term, it dates back to when we were talking about sick-building-syndrome. As I have said, we have achieved much in the name of sustainability and the industry should be proud, but we are entering a world of increased ridicule, stringent KPI's, and everyone wants to 'learn from their lessons'. When it comes to energy efficiency and carbon emissions, the terms are so vague and intangible that we can only trust in our energy modelling and the calculated or simulation results. But is that enough? To trust in the numbers that come from a software? Are we at the point where, to make informed investment decisions, we need to know if our homes and buildings are actually delivering the energy savings that we have designed in.

**Use case example**

Now, within all sustainability standards we see a fundamental shift from an architecture lead solution to technological led solution. Because technology – in the form of methods of construction and energy systems, play a significance role towards achieving a low carbon future, definitely for mass house building. Within these standards – building performance evaluation technology is aimed at energy, sustainability, environment and ecology – like u-value measurement, infrared, energy monitoring, air tightness testing, indoor air quality etc. And these are conducted by building physics and scientists well versed in the intricacies of thermal dynamics, human behaviour and technology performance, but only ever at one point in time, which is usually before anyone moves into the building.

Building performance evaluation (pre-occupancy) and post occupancy evaluation works seek to determine if the as-built thermal and energy performance is different to the building's as-designed performance. Here is were we presented 2 BPE/POE use cases to the audience at the conference. The first, containing 122 newly built homes – constructed in 2010: Project 1. The other was a 137 dwelling

housing development – constructed in 2016: Project 2.

The energy performance gap measured for Project 1, was as expected. On average, the dwellings were physically performing as per the as-design specification, those dwellings that were consuming excessive amounts of energy could, for the most part, be traced back to human energy use behaviour and levels of hygrothermal comfort. The project concluded that, the presence of in-home energy displays and an optimised home-owner quick start guide could be key to reducing instances of excessive energy consumption.

Now Section 7 of the Scottish Building Standards – Sustainability, was developed during the six years between the end of our project 1 and the start of project 2 – and it contained a human behaviour element to it – called the quick start guide and resource use display technology.

Now, we had a new hypothesis to test – namely – if we designed homes to be the best in section 7 – would that eliminate the performance gap?

The results from project 2 showed that the performance gap was worse than project 1.

A significant proportion of the dwellings were consuming seven to ten times more energy that what was estimated, and it had nothing to do with the thermal envelope or the performance of the energy and ventilation systems, they were all performing optimally.

After months of working with the clients, construction partners, and occupants we discovered that the homes were just too complicated. There were too many technologies, too control panels, too many interfaces, too many decision points, too much effort to maintain hygrothermal comfort,

A little later, with more occupant interaction we discovered that, when it comes to the occupant behaviour elements of the performance gap there is a curve. This curve is beginning to describe the impact of an occupant's prior experience with the heating and ventilation technologies and strategies in their old home before they move into the new homes with new low carbon heating and heat recovery ventilation systems in the new home. For Project 2, the new low carbon heating and heat recovery ventilation technologies behaved very differently to what was the norm for Scottish homes, very few occupants had any prior experience of these technologies. Upon reflection, the heating and ventilation systems in Project 1 were much more representative of the Scottish norm. Ultimately, all of these new and wonderful technologies were just too much for the majority of the occupants to solve, no number of in-home displays or quick start guides was going to help.

**Ending with the proposition**

And then there are smart home technologies, which grew in popularity during the monitoring period of Project 2. These are marketed as "after sales consumer products", but some of them play a fundamental part in altering the building's heat and light consumption, which are two energy demands values regulated by almost every building standard in the world, certainly the values in the European Commissions EPC methodologies.

The final questions now are – as all homes become more technology heavily, will the occupants eventually learn to use every type of control for any type of new domestic building – will this curve solve itself? If so, how long will that take? Or should we accept that energy and ventilation systems for homes are always going to be more complex? Should we accept that the sustainable home is behaving more like a non-domestic building?

Going back to the science and apparatus of building performance evaluation, the approach and technologies take a lots of measurements about the building's thermal and energy demand behaviour with highly detailed insights provided by BPE scientists, but it only does this for one point in time, the occupant never sees this data or results. Whereas, smart home technology takes lots of measurements throughout the building's life, and then it throws – sometimes hundreds of messages and alerts at the occupants. And then it is down to the occupants to interpret those messages and work out the best course of action. Importantly, there is very little alignment between the measures that BPE technology record and the measurements that smart home (energy related) systems record. But they both relate to energy demand.

We concluded that if we design smart home technology to capture information that is normally captured by building performance technology, and connect the outputs to control our environment – then we have technology for architecture futures.

For example, if we go beyond the novel smart thermostat:

- Can we embed thermocouples into junctions and corners to calculate real-time Temperature factors and connect that to ventilation systems to regulate accumulations of condensation;
- Can we embed heat flux sensors into walls, floors and roof to predict times for energy efficient retrofit;
- Can we add pulse sonic airtightness units, and solar irradiation sensors be linked to window control, dehumidification and air conditioning units;
- Can the same sensors can be linked to, UV LEDs woven within the fabrics of our furniture – rugs, pillows to emit healthily artificial light;

Well, with low-power, community wi-fi meshes, connected with central servers for a housing development or village, and slimline sensors that can be embedded within the thermal envelope – both of which exist – not only can this be done, but it can be done to scale.

There is a value proposition here:

- The housebuilding community would learn from real-time in-situ data about their products and their users, and could do away with archaic industry benchmarks, and use that data to between calibrate their energy models.
- For housing cooperatives, housing associations, landlords, and local authority housing – they would inherit technology that could proactive schedule energy retrofit maintenance
- Even the health care system would win – it would be a step in the right direction to collecting data for the better understanding of address sick building syndrome.

Finally, as our conscience, terminology, science and vocabulary moves away from the 'sustainable' and 'low carbon' homes to the inevitable 'healthy' homes, then we would be ahead of this curve, with all the data that we need to be solution-ready. ■

# From and to the community: A community-based eco-feedback application with co-design principles

Words by Moulay Larbi Chalal[a]*, Benachir Medjdoub[a], Richard Bull[a], Raid Shrahily[a], Nacer Bezai[a] and Miranda Cumberbatch[b]

[a] School of Architecture, Design and the Built Environment, Nottingham Trent University
[b] Nottingham Energy Partnership

While the implementation of eco-feedback systems can lead to energy savings in the region of 10-15%, research has shown that their effectivity decay overtime. This explains why recent initiatives in this area concentrate on 'moving beyond feedback' by leveraging social interactions which were proven to engage communities in long-term pro-environmental behaviour.

However, the involvement of community members in the design of eco-feedback applications has been limited. Our study addressed this research gap through working collaboratively with community members to develop an accessible eco-feedback interface. To attain this aim, we utilised the UK double diamond design framework where we first conducted an online survey questionnaire with 151 participants across the UK to gain insight into their preferences in relation to eco-feedback. Second, based on the survey findings, two participatory focus groups were organised with 20 residents in Nottingham City, UK to develop interface proposals. The created interface includes various information panels with the ability to expand to obtain deeper levels of information, as well as a community space for social interactions and the sharing of information and activities. This study gives new insights on the difficulties of developing eco-feedback interfaces using co-design principles. We also stress the potential for community member interactions during the design stages to enable for the production of novel ideas (e.g. integration of third-party applications). ■

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# Mission possible: five ways CIAT Chartered Practices can get more from remote working technologies

Words by Keith Ali, Managing Director, Creative ITC

Sharing real-world experiences and business outcomes from some of the world's leading architecture, engineering and construction (AEC) businesses, Keith explains how to overcome five common challenges when creating sustainable remote working solutions to ensure practices realise business benefits from digital transformation

Overcoming time and distance productivity barriers with new technologies that enhance effective project collaboration from anywhere is a huge issue for an AEC industry that operates on ultra-low margins. Yet, unlocking IT investment in the current climate remains a tough ask. Many AEC firms still struggle with post-pandemic balance sheets – indeed 60% identified the cost of technology as a main barrier to adoption.

In the transition to long-term remote and hybrid working models[1] many practices are considering (or reconsidering) virtual desktop infrastructure (VDI) to boost workforce mobility and productivity. Trumping remote desktops and virtual private networks, VDI is easy to scale, while large upfront CapEx is largely replaced by OpEx.

However, the AEC industry has historically struggled to get VDI to work effectively, mainly because off-the-shelf solutions weren't designed for heavy graphics users handling CAD, Revit, Photoshop and InDesign apps, or project teams working on huge BIM datasets. These issues have been compounded by evolving rendering solutions and growing client demands. When proposing sustainable and scalable technology solutions, IT departments must now overcome C-suite cynicism and user reluctance from previous poor experiences.

Can practices achieve the seemingly impossible? Is unshackling power users from offices achievable? Is a sustainable solution that improves global collaboration without introducing unnecessary cost and complexity realistic?

The answer to all these questions is yes.

**Five common VDI pitfalls and how to avoid them**
Most VDI projects fail through one or more of the following five reasons:

**1. Lack of user buy-in**
Nothing can stop a VDI project in its tracks faster that a substandard user experience (UX). This can result from inadequate compute or storage resources, inability to access file shares, latency issues, sub-standard WAN connectivity, poor app optimisation, and client device problems.

However, in the right hands, VDI can be engineered for the most demanding settings like super users working with big data or graphics-heavy applications. And, with purpose-built VDI and Desktop-as-a-Service (DaaS) solutions, they get tools and experiences identical to or better than they enjoy in the workplace.

Look for a supplier with a successful track record designing and deploying remote working technologies in the AEC industry. Their experience and understanding of virtualisation in the cloud and how industry-specific apps and network services behave together will be invaluable.

**2. The weakest link**
Legacy infrastructure is often the most severe limitation. For example, data, monitoring and reporting must sit on the same LAN as the VDI. While WAN problems – that technologies like VMware Horizon can help to fix – may not be the end of the world, there are no protocols to overcome LAN infrastructure issues like over-subscription, sub-10Gbps speeds, and availability issues.

Engage a specialist with end-to-end expertise from devices, connectivity and cloud to storage, security and UX. Make sure you'll benefit from access to the latest technologies and regular updates during the contract, rather than having to rely solely on legacy on-prem hardware or having to invest in expensive upgrades.

**3. Hybrid working demands**
Managing security and compliance has become more complex since the transition to remote working. Now part of the corporate network, personal computers and devices are susceptible to a wide range of attacks and security issues making it hard to ensure compliance with data being accessed on WFH and BYOD systems.

It is even more important that IT teams can choose which workloads to deploy in the cloud and which to retain on-premise. To optimise ROI, look for a provider who understands how to meet industry requirements and offers VDI consumption in the cloud, on-premise or using a hybrid model in a single seamless solution.

**4. Knowledge and expertise gaps**
Decide who manages what: in-house managed options – such as Windows Virtual Desktop (WVD) or on-premise VDI – or Desktop-as-a-Service supported by a VDI specialist.

Be honest about your in-house skillset and resources available to support and manage long-term VDI deployment. The managed service provider (MSP) route can quickly pay back with savings on data centre space, infrastructure, upgrades, licensing, application deployment, support, and headcount. Scrutinise their technical credentials and be confident they can deploy the right solution and provide ongoing management, optimisation, and 24/7 support.

**5. Unrealistic financial expectations**
Before and after IT infrastructure costs can remain flat or even rise slightly with VDI implementation. Providers offering VDI solutions designed solely to save money should ring loud alarm bells. A more realistic approach is to build support based on a specialist provider's ability to unlock much greater value for around the same outlay.

Check that cost comparisons are like-for-like. In moving from on-premise VDI or WVD managed in-house to Desktop-as-a-Service delivered by an MSP, start by calculating the total cost of ownership (TCO), usually over a five-year period. In-house expenses should include hardware refreshes, virtualisation software and additional GPU, together with costs associated with system administrator salaries, power, rack space, out-of-hours staffing and training costs to support the deployment.

Many providers differentiate between VDI profiles for ordinary and power users. To reduce TCO further some VDI specialists also offer scalable pricing. Clients pay per user, per month, per profile by purchasing credits stipulated and reallocated by IT teams in any way they like. Creating VDI burst capacity and instant scalability for fast-changing business needs.

**Broadway Malyan – a solution for the remote working long haul**
Award-winning architectural practice Broadway Malyan explored several VDI options to boost workforce mobility and project collaboration. None of them lived up to their promise. One solution got as far as trial but was too slow and couldn't handle big files and applications.

Following industry recommendations, the practice selected Creative ITC's purpose-built VDIPOD platform, specially designed for heavy graphics application communities like AutoCAD and Revit BIM. Creative specialists met daily with the in-house IT team – exchanging knowledge, heading off potential issues and building a solid proof of concept. VDIPOD with thin clients was initially rolled out to 40 users based in the UK, Portugal and Madrid. The number of users doubled after just two months as the buzz spread around the business.

> **In a number of cases, VDIPOD beat the users' previous laptop or PC setup for speed and overall experience.**

"In a number of cases, VDIPOD beat the users' previous laptop or PC setup for speed and overall experience," said Ronnie Vasconcelos, Director of IT at Broadway Malyan.

Now, employees suffer less downtime and work more productively when sharing plans, designs and other large files. The practice is reaping IT benefits, too, with specialist support freeing up in-house resources. Each software patching exercise used to tie up two people for around ten days. Now, the IT team can push out updates centrally, leaving more time for innovation.

Moreover, the practice was able to switch seamlessly to home working during the pandemic and now has a scalable, sustainable solution to boost future collaboration.

So, VDI isn't mission impossible. In the right hands, DaaS solutions can be purpose-built using best-of-breed technologies that enable architects, engineers, project managers and construction professionals to effortlessly use heavy-graphics apps, control data and exchange large files – at home, in the office, or on the move. ■

1 No full-time return to the office for over a million - BBC News


# Futurebuild returns for 2022

Words by Moulay Larbi Chalal[a]*, Benachir Medjdoub[a], Richard Bull[a], Raid Shrahily[a], Nacer Bezai[a] and Miranda Cumberbatch[b]

Registrations for net zero pioneering event Futurebuild are now open. The event that has championed a sustainable built environment for the past sixteen years takes place from March 1 to 3, 2022 at ExCeL, London. Futurebuild is a platform for innovation, connecting specifiers, decision makers and disruptors in Architectural Technology with major brands and start-ups from across the built environment sector.

If there is one message that is loud and clear from the global climate emergency, it's that we cannot go on as we are. According to the UKGBC, the built environment currently contributes 42% of the UK's carbon emissions — produced by both existing buildings and constructing new infrastructure. Drastically reducing emissions over the next decade is vital to keeping global temperature rise to 1.5 degrees. The recently announced UK Government 'Net Zero Strategy; Build Back Greener' and the COP26 climate change conference set out the plan for reaching net zero targets and emphasise the importance of taking action now.

The outcomes of COP26 will help accelerate sustainable initiatives, but the industry must also come together to share the technologies we need to make these changes. Futurebuild, previously Ecobuild, will be perfectly timed to focus on how the built environment sector will address these key issues and will be the catalyst for transformational change. The focus can no longer be about net zero ambition — it is about delivery.

**About the event**

As the only event to attract 20,000+ senior professionals from right across the built environment, Futurebuild is the perfect opportunity for the industry to meet and collaborate. Working together is the only way to achieve the transformational change needed if the built environment is going to reach net zero.

Futurebuild 2022 is a platform for innovation, creating an exhibition that focuses on six sections — buildings, offsite, interiors, resourceful materials, energy and critical infrastructure. The curated event will showcase over 250 leading brands, these are the companies who are developing the most innovative technologies, products and solutions.

During the event visitors can participate in the innovation trail, which highlights the event's innovation partners. Visitors will see first-hand how companies are already paving the way for a sustainable built environment and can share their contact details with digitalised badges to build relationships after the event. Exhibitors

have also been invited to enter The Big Innovation Pitch — a competition that celebrates new approaches to the biggest challenges facing the industry. Futurebuild will showcase the final products and announce the winner during the event.

**Spotlights**

The event will also feature six spotlights. Digital Impact, for example, is organised in partnership with Glider and with associated partners such as CIAT. Digital Impact offers a spotlight for digital construction and emerging technologies, showcasing the digital ecosystem of construction. Technology has transformed, and will continue to transform, a range of industrial sectors. The built environment sector, in particular, has witnessed rapid upheaval over the past decade and digital technologies, such as Building Information Modelling (BIM), have unlocked unprecedented opportunities for growth for architectural technologists. As well as exploring these technologies, the spotlight's speaker programme will feature leaders, pioneers and game-changers as well as stories from those who are achieving outstanding results and what processes they followed to achieve this.

Futurebuild 2022 will also feature spotlights on Whole House Retrofit in partnership with the Retrofit Academy, Circular Materials in partnership with 540 World, District Energy in partnership with UKDEA, Future Installer in partnership with MCS and Intelligent Buildings in partnership with KNX. These spotlights will include a mixture of presentations, discussions and practical demonstrations that will cover the fundamental issues facing the built environment.

**Collaboration is key**

"Now it is more important than ever to meet in person and do business face-to-face because our exhibitors and attendees are all working towards a common goal — achieving net zero" explained Martin Hurn, Event Director at Futurebuild. "To ensure we can deliver a sustainable future we've curated an event that cultivates cross-sector collaboration, addresses key industry issues and inspires transformational change.

"Futurebuild will be the essential platform to showcase existing, or launch new, disruptive technologies for the sustainable built environment to our audience of buyers and specifiers. For example, in our Futurebuild 2020 report, 75% of attendees stated that they attend the event to source or purchase the latest innovations in their field," continued Hurn.

Throughout the event, the most influential and pioneering thought leaders will take to the stage at Futurebuild's renowned knowledge programme, to address the industry's most pressing issues. This includes a conference programme sponsored by Construction Innovation Hub that will explore ambition towards net zero on a macro-level, as well as two keynote stages. Each keynote stage session will be delivered by industry-leading partners and associations such as the RIBA, Passivhaus Trust, MCS, BEIS, MPBA, ASBP, Good Homes Alliance, The Concrete Centre and many more.

**Futurebuild will be the essential platform to showcase existing, or launch new, disruptive technologies for the sustainable built environment to our audience of buyers and specifiers.**

The built environment has limited time to transform the built environment sector if we are going to meet net zero targets. Many of the innovative, forward-thinking brands, from start-ups to large corporations, that can provide all the products and processes we need to deliver change already exist. The built environment community is passionate about solving the climate emergency — by bringing them together we can accelerate innovation.

If you're interested in visiting Futurebuild 2022 and exploring the most innovative products and solutions in the built environment, visit the website to register. ■

# Architectural Technology research at Edinburgh Napier University

The Institute, as part of its Accreditation procedures, recognises educational establishments as Centres of Excellence for demonstrating a robust research culture, which has a direct and significant impact to the discipline of Architectural Technology. Not only do educational establishments prepare future professionals, they are also responsible for some of the innovation which is being adopted by industry. The research institutes within our four Centres of Excellence are being highlighted in *AT Journal* this year and we continue this issue with Robert Gordon University.

Based within the School of Engineering and the Built Environment, the Institute for Sustainable Construction (ISC) supports research and innovation for the construction industry and timber industry sectors and hosts the Centre of Excellence at Edinburgh Napier University. ISC is composed of six applied research centres encompassing smart cities, energy of buildings and renewables, offsite construction, timber technologies, wood science and acoustic engineering.

Annually over £20 billion of UK buildings infrastructure incorporate our technical specifications and design resulting from our applied research. ISC staff and students engage on over 200 live construction projects per annum and have supported over 300 new construction products and systems to market. New innovations designed by staff and our research students have delivered over £300 million in cost savings and increased income to companies in the construction sector. ISC's expertise in timber construction and wood science has led to new products worth more than £65million a year to the UK timber and construction industry. ISC staff and research provide a vibrant and dedicated community, focused on a common goal and commitment of driving innovation in sustainable construction.

ISC research teams have twice been awarded the Queen's Anniversary Prize (2009 and 2015) and is the UK's most prestigious form of national recognition open to UK universities or colleges. The Prizes were awarded for the internationally acclaimed work for industry, innovation and environment for (1) sustainable construction, timber engineering and (2) sound insulation through development of robust details. This led to a four-fold reduction in noise complaints and the most comprehensive global database on noise and vibration transmission in buildings. Performance compliance rates have achieved 99%, up from 50% before the introduction of the RD approach.

During the course of the last decade the Centre of Excellence has built partnerships with over 45 countries ensuring a universal perspective to the teaching and

research we carry out, providing solutions to local to global issues. Some key major projects have included 'Low carbon building technologies gateway', 'Wood products innovation gateway' and developments on offsite and low carbon housing achieving significant awards, recognition and support with industry in developing new construction innovations.

ISC project outcomes and reports have led to new standards such as British Standards on Timber Cladding, new proposals for CEN and ISO standards for sound insulation and 18 government reports on environment, construction processes, offsite, skills, noise reduction and sustainability. ISC research projects involving retrofit, new build or future fore-sighting all feed the research into teaching for the Architectural Technology undergraduate and postgraduate programmes. To support the global low carbon timber construction future a new MSc Timber Architectural Design and Technologies commenced in 2019, bringing key ISC experts to lead on programme course modules to enhance and support the status of the CIAT Centre of Excellence.

### Offsite Timber Manufacturing for a Sustainable Built Environment

The world's population is becoming increasingly more urbanised and we are spending up to 90% of our time in the built environment according to the United Nations. Construction itself is globally on an upward trajectory despite its inherent productivity challenges, as it stands this will exacerbate further its negative environmental impact.

As forests grow, they lock in carbon and the utilisation of timber in the built environment elongates the sequestration period. Delivering the built environment via a factory based approach via offsite reduces waste, improves working conditions and enhances productivity. Offsite timber construction can therefore respond to the mounting challenges of how we deliver global communities more sustainably.

It is an exciting time for timber as a construction material with new engineered timber products such as "massive timber" re-setting the boundaries of what can be done. Digitisation is also unlocking the potential further with the ability to create environmental traceability back to the forest floor at one end and full virtual reality visualisation of the finished product at the other. The Centre for Offsite Construction and Innovative Structures is a key research centre at Edinburgh Napier University which is enhancing through applied research potentials of timber engineering and offsite approaches.

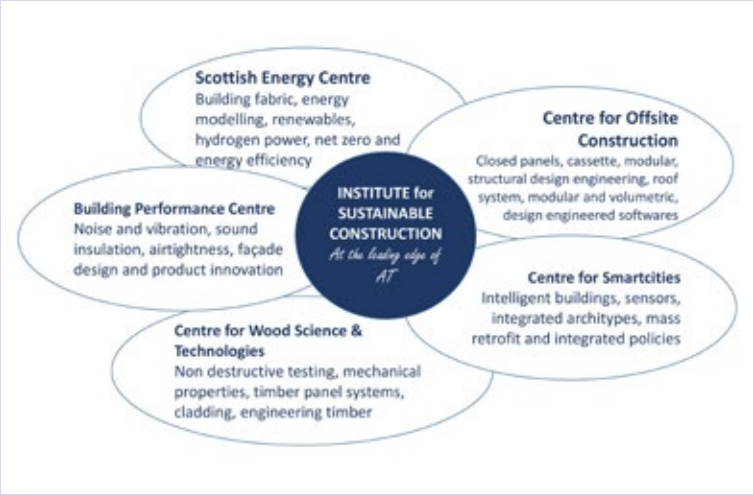
Major offsite projects have included the new Dyson Institute halls of residence, 7 storey CLT apartment project with CCG OSM, Glasgow Commonwealth Games Athletes Village and new design softwares with global companies such as Trimble.

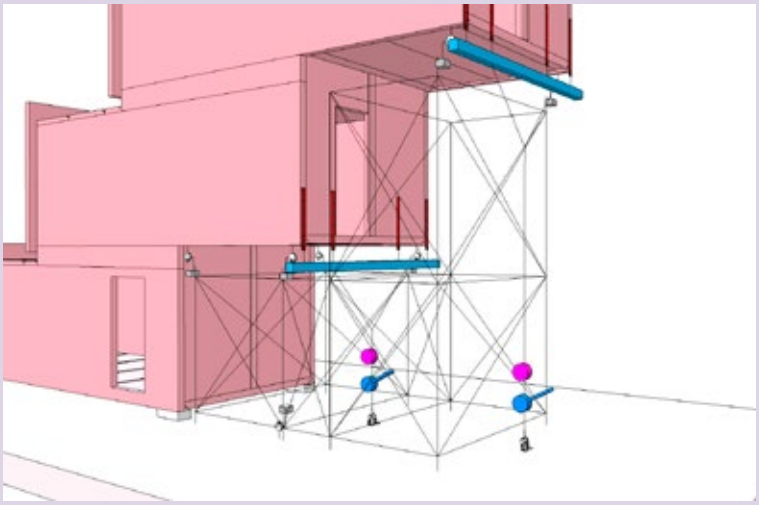
More recently "Multi-Ply" was an American Hardwood Export Council collaborative project to create an exhibition for the London Design Festival in 2018. Designed and Engineered by Waugh Thistleton Architects and Arup, the project utilised a Scottish supply chain of Glenalmond Timber, the Construction Scotland Innovation Centre and Edinburgh Napier University to process imported tulipwood into Cross Laminated Timber. This enhanced the knowledge and capabilities of how this material could be applied to future global cities and towns.

### Global Challenges – A Future Framework for Emergency Shelter Design

Globally the number of the displaced people has been increasing significantly during the past decade, now reaching over 70 million. The Syrian conflict in the Middle East has brought more attention to the refugee issues globally and specifically in relation to large forced displacement. While refugee camps are generally considered to be temporary, reviews of previous case studies detail much longer stay periods and permanency. Organisations, academics, and designers have been trying to solve the sheltering issues by proposing various designs, but they remain unresolved. Therefore, there has been a need to review and change the designing approach.

The aim of this research project by PhD student Lara Alshawawreh was to introduce a 'Transitional shelter design criteria' for the Middle East and apply it into a proposed design outline that can be part of a future 'shelter process'. The project involved investigating the current sheltering challenges faced by refugees in the Middle East and identifying the required design elements based on culture and context. Several field visits were conducted to Syrian refugee camps in Jordan (namely Zaatari and Azraq), where focus group discussions, observatory tours, and participatory design sessions were held in the camps. This work has now led to a series of recommendations and guidelines for potential utilisation in future criteria and design outlines. Both culture and context were two elements that have been found to be important factors in shaping the users design preferences. Shelter design flexibility is considered as a key element in addressing large-scale shelter design responses. On this basis, it is recommended to have shelter design criteria and a primary, yet flexible core design for each continent, which could be adopted and adapted in cases of disasters. This procedure will not only lead to a better sheltering response, but could also save time, which is a crucial element in emergency response ■




# What is 'added value' and why does it matter?

Words by Karyn Williams FCIAT, Chartered Architectural Technologist, Stride Treglown

My first sense of what it means to 'add value' began fifteen years ago when I presented an interior design scheme to a classroom of five year olds. The hope was I could bring them along on the journey to create their new school. Instead, I found myself awkwardly discussing green carpeting with small children whose attention span was definitely shorter than I was used to!

In the moment, it might have felt simpler and more efficient to make design decisions in isolation. However, looking back, my time with those children was invaluable. It made me realise how important it is to take time to listen and understand those relationships, and the wider needs of our clients, to ensure we deliver what is required for the immediate future but also for the longer term.

It was this early career experience that sparked my interest in collaborative working relationships, the importance of engagement and positive business cultures within project delivery. And now, as Head of Social Value for Stride Treglown, I am proud that our approach to business is one without ego. Our culture and ethos have always prioritised people alongside our planet and partnerships in the places we create.

As an industry, we can no longer design or build without recognising our social accountability – and rightly so. Social value is growing in importance alongside our planetary emergency and our responsibility to design safely.

As a Chartered Architectural Technologist, it is good to understand why social value is so important and the relevance it has to your role.

**What is it all about?**

The Public Services (Social Value) Act 2012 (England) emerged in the industry as a trigger for delivering positive social change, accompanied by Wales and Scotland a few years later. The legislation demands that projects will improve the economic, social and environmental wellbeing of the area it occupies and asks how this will be secured.

Almost a decade later, our public clients are referencing a requirement for demonstratable social value within their tenders ensuring a return on social investment is delivered back into the community.

Contracting authorities may assess projects to ensure they provide improved opportunities for employment and skills development, tackling climate change or improving supply chain ethical practice and investment. The weighting can be scored from 5% of the contract value up to 20% in some cases, with your commitments and delivery plans acting as deciding vote between your cost and quality responses. Some clients may even take this further and apply liquidated damages for failure to delivery against these early social value commitments.

Private clients so far appear to be motivated to collaborate with practices who operate with a similar business ethos and cultural identity. Increasing cultural pressure from their own clients for socially responsible practices may well be a motivator to deliver more positive change formally. Like carbon reduction practices, those that resist may well be left behind.

However, having a socially conscious business with recognisable ethical business markers, such as Considerate Contractors, Carbon Trust Certification or the WELL Building Standard, is certainly worth shouting about. For those that resist change, the local authority planning approval framework provides the perfect opportunity to apply benchmarking standards unilaterally to ensure projects deliver the wider community benefits needed.

Contractors have more experience in engaging with the wider communities at a project level. Previously termed CSR or community engagement, they have been supporting apprenticeships, supply chain and contributing resources before the Social Value Act appeared. It is now time for us as consultants to take responsibility for ensuring the places we create provide positive long-term social, environmental, cultural and economic futures for the wider communities.

As designers, we should lead this discussion and I believe we are best placed to orchestrate and integrate sustainable, innovative and flexible solutions from the start of the design process and not relying on contracting partners to engage towards the end of the process.

**What does 'good' look and feel like?**
As an industry we are certainly reacting to the brief and social value is growing in importance. Industry bodies are collaborating and developing definitions and guidance documentation to support designers with the practical delivery of social value at a project level.

Social value calculators, such as TOMS, HACT or the Value Toolkit amongst others, are widely available to help you establish what social value return has been delivered in financial terms that are easily recognised. Pre-defined metrics enable this return to be calculated for any project sector, value or scope.

Reviewing the wider needs of a project's community on its own merit helps develop a strategy around it's specific needs. A hospital refurbishment, mass housing development or new school will offer a different impact within the wider community and discussions to maximise opportunities should begin at the start of the scheme.

The ways in which you can contribute can extend from classroom talks, career mentoring, reducing carbon emissions, travelling sustainably, trainee placements, prompt supply chain payment or providing access to health and wellbeing initiatives. Offering financial contributions to forest planting schemes or food banks is helpful but exclusively donating money in isolation without supporting ethical practice is simply social value offsetting. We cannot continue to operate without conscience and social value should encourage a changing balance towards delivering purpose with profit.

We have a responsibility to ensure our projects leave a positive legacy for our future generations and our recent installation 'Sinking House' in Bath is a perfect example of how we can challenge convention and choreograph a positive direction of travel.

The installation formed a key element in our Climate Action Relay, an eight-week programme of sustainability events in the run up to COP26. It was an effective collaboration with local businesses to provoke and inspire action across the built environment, a major contributor to global CO2 emissions, and a call to action for our partnerships to reduce the negative impact this industry has on the planet and its inhabitants. This collaboration is binding the community in Bath and the construction community together.

Not all projects should be focussed on activities which can be financially measured. Some projects confidently and robustly demonstrate added value through their process, encouraging new ways of working, focussed clearly around people and the delivery of meaningful outcomes within the design.

Our award-winning Deaf Academy project delivered social value through the extensive level of engagement and the ways we worked with our client to secure a greater understanding of 'DeafSpace' design principles and the latest in deaf technology. The resulting design is completely bespoke and means that deaf children are able to focus on their educational and social needs without added barriers. The added value here is tangible.

**Stronger together! B Corp.**
Becoming B Corp certified has allowed us to formalise our stance on social value – balancing purpose with profit is now a legal requirement for employee-owned Stride Treglown, the first AJ100 practice to achieve certification.

B Corp is an emerging movement in the UK, having initially been developed in the USA. Certified B Corporations are businesses that meet the highest standards of verified social and environmental performance, public transparency, and legal accountability to balance profit and purpose.

We are incredibly proud of the transparent nature of assessment which provides a certified framework to improve our social and environmental impact across our business activities in the future. It provides our clients with a guarantee that we will help them meet their own requirements and together with our recent Carbon Neutral announcement has been a key attraction for recruitment.

More widely B Corp brings everyone together with a united goal. B stands for Better and the networking opportunities that have arisen since our certification in January has been remarkable.

**In the end**
We all take pride in handing over buildings to delighted clients. It is the dopamine hit we desire that makes the project journey worthwhile, rewards us for working well together and fades away those difficult challenges. We help to create a powerful legacy for the future of communities and it is undeniable that it is a rewarding feeling when the users are looking forward to their future in the spaces you have helped create. ■

# Invitation to join the Finance Committee | Interested in becoming involved with your Institute?

## An opportunity has arisen for a Member to join the Finance Committee.

**Do your interests lie in numbers and figures?**
**Do you have experience in finance?**

If so, an opportunity has arisen for a Member to join the Finance Committee. The suitable candidate should have an interest in the Institute's finances and how they are budgeted and invested. If you have a background in business , then this will be ideal for the role.

Any Chartered Architectural Technologist can volunteer for this position.

The Finance Committee has a pivotal role within the Institute and its activities are critical to the success of running CIAT as a business. Working with the Honorary Treasurer, Accountant, Chief Executive and auditors, the Committee is responsible for setting the budget and receiving and reviewing the audited accounts. It reports directly to the Executive Board which receives its recommendations in advance of considering the budget and audited accounts for approval.

The Committee is also responsible for developing the financial policies for the Institute, the Regions, Centres and aspirATion for approval by the Executive Board. It must also report to Executive Board and Council on the management accounts to ensure the Institute operates within the approved budget or considers the need to review the budget.

The Honorary Treasurer Chairs the Committee and reports to the Executive Board, Council on behalf of the Finance Committee and at General Meetings on behalf of the Institute.

As a member of the Finance Committee, you must be able to think objectively and have an understanding of financial structures. CIAT is a not-for-profit organisation, with a global reach with Regions and Centres worldwide. Its income comes primarily from subscription fees. The activity of the Institute is governed by the Strategic and Corporate Plans. The Institute also has subsidiary companies which undertake activities which fall outside the scope of the Royal Charter.

This appointment is from outside of Council and we welcome expressions of interest from any Chartered Member irrespective of their location as you can join the Institute remotely dependent on where you are based and any travel restrictions in place.

If you are interested in this position, please email finance@ciat.global providing your name, membership number and a brief statement explaining why you should be considered for the Committee.

Should you wish to discuss this further, please do contact us via the same email.

Expressions of interest should be submitted no later than Friday 21 January 2022.

CIAT

CIAT is committed to making Architectural Technology and the broader built environment sector an equal, diverse and inclusive profession, representative of the societies our members work within, to create a safe environment for the Architectural Technology community.

# Chartered Architectural Technologist James Roberts MCIAT wins Paralympic Wheelchair Rugby Gold

Great Britain secured its first ever Paralympic medal in Wheelchair Rugby after beating the USA 54-49 in Tokyo, and Corstorphine & Wright Architecture's Chartered Architectural Technologist, James Roberts MCIAT was the top scorer of the game, scoring 24 tries.

From an early age, James has always been a keen sportsman competing in rugby and squash teams for many years. Shortly after completing his first year at Coventry University he contracted bacterial meningitis. After three years in hospital, which saw the amputation of both of his legs, in 2010 James returned to Coventry University to complete his degree - gaining a First-Class Honours in Architectural Design Technology.

**What I love about architecture and Wheelchair Rugby, is that I am part of a team in both worlds...**

It was during his stay in hospital, that a nurse introduced him to the sport of Wheelchair Rugby. Upon returning to university, Wheelchair Rugby became a big part of James' life and it was not long before he was picked for the GB development squad.

James spent the next three years playing on both sides of the Atlantic, playing with Phoenix Heat in the US championship and London Wheelchair Rugby Club in the British and European leagues. It is this very team spirit to which James also brings to his role at Corstorphine & Wright as Senior Architectural Technologist.

In his own words, James stated: "What I love about architecture and Wheelchair Rugby, is that I am part of a team in both worlds, although my roles are very different in the two, there are similarities in both disciplines; I am working with people to achieve something greater than any of us could achieve on our own."

Group Director, Jeff Downes added: "James has something special, and he truly is an inspirational colleague, who richly deserves the Gold medal he won in Tokyo. We admire and respect his fantastic achievements and I am so pleased he continues to be part of the Corstorphine & Wright team. James is a testament to hard work, juggling the challenges of architecture and rugby, and always striving to be better in both."

James is currently working on a new scheme which will see the transformation of the former Bargate Shopping Centre, as it opens up and celebrates some of Southampton's richest historical assets.

The almost £100 million investment into the city will see the redundant 1980s shopping centre demolished and the site transformed into a vibrant quarter, delivering a residential-led scheme with retail at lower street-facing levels.

The Bargate Quarter will deliver over 500 new build-to-rent apartments, including townhouses, all set across thirteen blocks of accommodation.

James is also currently working on a planning application for a new trade and retail park at the coastal town of Herne Bay which will bring many new businesses to the area and a boost the economy. As well as the Magniac Building, at Colworth Park, home to Unilever's scientific research. This is the redesign of existing ground floor spaces, providing specialist laboratories, offices and meeting spaces.

James was also recently part of a team who completed a shell only development at a Marks & Spencer store in Maidstone, assisting on the project from planning through to completion which involved project information management and the coordination of sub consultants on the development.

James added: "Training for the Paralympics was intense both at home and then when we entered the training camps, but it was worth it to come back with the gold under our belts." Defeating the USA in the final gave GB its first gold in a team sport in the Games' 61-year history and the first for a European nation in the sport.

An outstanding achievement for a determined and focused, yet gracious young man who has a very successful career ahead of him. ■

# Honorary Officer elections 2022 reminder: deadline for nominations 13 December 2021

The election process and how you could become influential within your Institute, shape its future and that of your profession.

For 2022, there are three positions for election which are open for nominations:

### President Elect/President

The President is the principal external face and figurehead for the discipline, the profession, members and affiliates and the Institute. The Institute operates as a team and the position leads the team working with Council, the Executive and the Chief Executive implementing the Strategic and Corporate Strategy.

One of the key activities for the President is external engagement, with members and affiliates, fellow professionals and organisations at local, national and international level as necessary, both in person and remotely.

Chartered Architectural Technologists who undertake this position must possess strong analytical skills and the ability to make informed decisions and considered judgments. The ability to interpret and understand information along with excellent communication and presentation skills.

### Honorary Treasurer

The Honorary Treasurer's principal role is as Chair of the Finance Committee. The Finance Committee, works with the Chief Executive and the Finance Department, to oversee the financial matters relating to Institute business such as the budget, the setting of subscription fees and reviewing and approving the independently audited accounts. The Committee make recommendations regarding finances and financial policies to the Executive Board.

### Vice-President Technical

The Vice-President Technical works closely with the Vice-President Practice, Practice & Technical Director and Practice Department and its relevant Taskforces in overseeing the technical issues relevant to the Institute, which ensure the maintenance and improvement of technical standards within Architectural Technology and the built environment sector. The role also embraces current industry issues, impacting the nations in which CIAT has a presence.

A Chartered Architectural Technologist undertaking this position must be a practising Chartered Architectural Technologist and have knowledge of the technical aspects of Architectural Technology with an understanding of legislation and regulations. They must also be confident and able to represent the discipline at the highest level which includes Governments.

All candidates must be able to undertake business via email or other electronic mediums.

### How can I be nominated?

To be nominated for any of the positions, a fellow Chartered Architectural Technologist must nominate you in writing to the Returning Officer, who is the Chief Executive. Any Chartered Architectural Technologist is eligible to propose a candidate, although no nomination is permitted without obtaining the prior consent of the nominee. Any Chartered Architectural Technologist can stand for any position in these elections. No prior experience is required of the Institute – just a passion for Architectural Technology and the Institute.

### When would I assume the position if I were elected?

All three positions take effect from the close of the 2022 AGM on 19 or 26 November 2022.

**Full details can be found in ATJ issue 139, autumn.**

### Key dates summary

Call for nominations close
13 December 2021

Acceptances (or rejections)
22 December 2021

Manifestos/profile received
1 February 2022

Issue of candidates and their manifestos to all members via an ealert/update of election section of the website
24 February 2022

Issue of candidates and their manifestos to Regional/Centre Committees
24 February 2022

Presentation at Council
12 March 2022

Campaigning by candidates
24 February – 9 September 2022 inclusive

Election ealerts and updates on the website
24 February – 9 September 2022 inclusive

Election at Council
10 September 2022
Candidates advised if not in attendance at Council

Ealert announcing the election results
12 September 2022

Assumption of position
19 or 26 November 2022 close of 2022 AGM

### Further information

For further information or clarification contact Adam Endacott, Editor, a.endacott@ciat.global

# Membership news

**Chartered Architectural Technologists**
We would like to congratulate the following who successfully attended their Professional Interview and are now Chartered Architectural Technologists, MCIAT:

| | | |
|---|---|---|
| 024342 | Matthew Davies | Northern, 01 |
| 023896 | Craig Dolan | Northern, 01 |
| 033049 | Thomas Bowman | Yorkshire, 02 |
| 0000219 | Grace Flannery | Yorkshire, 02 |
| 029330 | Adele Brindle | North West, 03 |
| 027476 | Harriet Rose | East Midlands, 04 |
| 017837 | Robert Beaman | West Midlands, 05 |
| 027084 | Guy Siragher | East Anglia, 07 |
| 024054 | Majed Asad | Greater London, 09 |
| 031803 | Joseph Lawrie | Western, 12 |
| 032313 | James Pass | Western, 12 |
| 033197 | Jade Campbell | Scotland West, 13 |
| 029047 | Nicole McConville | Northern Ireland, 15 |
| 012829 | Mark Miskimmin | Northern Ireland, 15 |
| 032530 | Dewi Jones | Wales, 16 |
| 0000404 | Chao Chen | Republic of Ireland, C2 |
| 033297 | Gary McCarthy | Republic of Ireland, C2 |
| 035605 | Dermot Troy | Republic of Ireland, C2 |

**Welcome back**
We would like to welcome back the following Chartered Architectural Technologist and Architectural Technician:

| | | |
|---|---|---|
| 020941 | Simon Traynor | Northern, 01 |
| 020769 | Leah Jones | East Anglia, 07 |

**Fellow Members**
We would like to congratulate the following Chartered Architectural Technologists who successfully completed their application and are now Fellow Members, FCIAT

| | | |
|---|---|---|
| 012673 | Steven Barlow | South East, 10 |
| 022413 | Russell McCourty | South East, 10 |
| 028605 | Steve Berry | Wales, 16 |
| 017684 | Tom Kinver | Wales, 16 |
| 008319 | Martin Meehan | Republic of Ireland, C2 |

**In memoriam**
We regret to announce the death of the following members and affiliates:

| | | |
|---|---|---|
| 000836 | Anthony (Tony) Partington | West Midlands, 05 |
| 003573 | Jeffrey Gitlin | Greater London, 09 |
| 001706 | Alfred Grange | South East, 10 |
| 028401 | Karl Robinson | North West, 03 |

**Owen Luder CBE PPRIBA 1928-2021**
CIAT is sad to report the death of Owen Luder on Friday 8 October 2021 aged 93. Owen served as Chairman of the Architects' Registration Board and twice as President of the RIBA, between 1981-83 and again between 1995-97. During his first tenure he was a key figure in supporting the development of the Society of Architectural and Associated Technicians (SAAT, now CIAT).

Paul Newman PPSAAT PPBIAT MCIAT, President between 1984 and 1986, paid tribute to Luder, saying: "I remember Owen well. He helped in the then very uneasy negotiations between the RIBA and what is now CIAT. In fact, I would go as far to say we would not be CIAT today if it was not for his support and advice. We met as two Presidents and quickly established a rapport that continued for years. He was very proud to inform me that he was basically a bricklayer that made good and perfectly understood the need for the professions to appreciate input from the construction industry and in particular the trades. He was an avid Arsenal supporter and we hosted each other for games home and away with my Nottingham Forest. His famous bow tie will always be in my memory. A unique character who will be sadly missed."

**Architects' Benevolent Society (ABS) updates**
ABS recently said goodbye to six of their longer serving Trustees, which included Kathy Thurman MCIAT (pictured), who have now retired. Kathy served as Trustee representing CIAT and we thank her for her hard and dedicated work on behalf of the Institute.

On Tuesday 13 July 2021, President Eddie Weir received an award from the Worshipful Company of Chartered Architects (WCCA) to recognise his support to the work of the ABS in the previous year. This year's award, designed by Jane Duncan OBE PPRIBA, ABS President was presented by the Renter Warden, Chris Dyson at the Annual Election Court Lunch. ABS were delighted to nominate Eddie, ABS Ambassador, as the recipient for all the support he gave throughout the COVID-19 pandemic in 2020. Eddie's support enabled ABS to make new connections with industry organisations that resulted in donations towards the ABS Emergency COVID-19 appeal and long term sponsorship of events of over £10,000. As a result of his strong work ethic and dedication to the charity's cause, in 2017 Eddie was appointed an Ambassador role, committing more of his time to helping people in their time of need. Eddie's involvement with ABS has been paramount in helping to introduce the charity to a big pool of people who have helped raise awareness of ABS support services and get involved in fundraising activities and events across the UK.

Upon receiving the Award, Eddie said: "I send my sincerest thanks to the WCCA for their kind words and hospitality, and to my dear friends at the ABS for their continued support to our architectural family. Thanks to the wonderful Jane Duncan PPRIBA for designing such a beautiful plate. It is an absolute honour to receive such an amazing award. I am truly delighted."

futurebuild

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